The burden of hip and knee complaints

van der Waal, J.M.

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The burden of hip and knee complaints

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promotoren:	prof.dr. L.M. Bouter
	prof.dr. J. Dekker
copromotoren:	dr. D.A.W.M. van der Windt
	dr. C.B. Terwee

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“Our happiness or our unhappiness depends far more on the way we meet the events of life than on the nature of those events themselves”

Wilhelm von Humboldt

Chapter 1
General introduction

Hippocrates, a Greek philosopher living 2500 years ago, is the 'father' of medicine and son of a physician. He was one of the first to describe rheumatology. During his lifetime not many different medical specialists were available and health care was not very organized. Since the Roman ages, times have changed and health care has become organized. Nowadays, in the Netherlands, an individual's first access to medical services is through their general practitioner (GP). The GP acts as a "gate-keeper", deciding who will be referred for specialist care. The GP, therefore, has an important role in the Dutch (and other, e.g. UK) health care systems. The GP is frequently confronted with musculoskeletal complaints which represent more than half of all chronic conditions. Although musculoskeletal complaints are generally not fatal they are the most common causes of severe long-term pain and physical disability[1]. The prevalence of musculoskeletal pain is high: in the Netherlands the point prevalence of is 54%[2].

The Bone and Joint Decade

On January 13, 2000, the World Health Organization formally launched The Bone and Joint Decade in Geneva. This initiative was motivated by the epidemic of musculoskeletal disorders that is expected worldwide as the population ages[3]. A longer life expectancy and an increasing number of elderly population groups have led to an increasing incidence of musculoskeletal disease worldwide. The Bone and Joint Decade is a global campaign with the general aim to improve the quality of life for people who have musculoskeletal complaints and to advance the understanding and treatment of these conditions through research, prevention and education[4]. The campaign has four major aims: to raise awareness for the growing burden of musculoskeletal disorders on society; to promote prevention of musculoskeletal disorders and empower patients through education campaigns; to advance research on prevention, diagnosis and treatment of musculoskeletal disorders; and to improve diagnosis and treatment of musculoskeletal disorders.

The burden of musculoskeletal complaints

Musculoskeletal complaints can have an impact on many aspects of society. Firstly, musculoskeletal complaints can have a considerable impact on the patients who suffer from it. Osteoarthritis, rheumatoid arthritis and other musculoskeletal conditions are a major cause of pain and impaired physical functioning[5]. Furthermore, psychological distress has been shown to be common among patients with musculoskeletal complaints[6], indicating that these complaints also impact on emotional functioning.

Secondly, the GP is confronted with these complaints very often. In the Netherlands between 33 and 42% of people with musculoskeletal complaints consulted their general practitioner[2]. Data from the Second Dutch National

Survey of General Practice have shown that the consultation for complaints of the musculoskeletal system is highest of all[7].

Thirdly, musculoskeletal complaints can have important socio-economic implications. The total direct costs for use of health services that result from musculoskeletal conditions has been estimated at 0.7% of the gross national product in the Netherlands, 1.0% in Canada, and 1.2% in the USA[8;9]. Data from Sweden show that the relative costs of illness of diseases of the musculoskeletal system have increased substantially, while the relative costs of illness of any other disease category were more or less stable[10]. Furthermore, musculoskeletal complaints are major cause of sickness absence and work disability in developed countries[11;12].

Hip and knee complaints

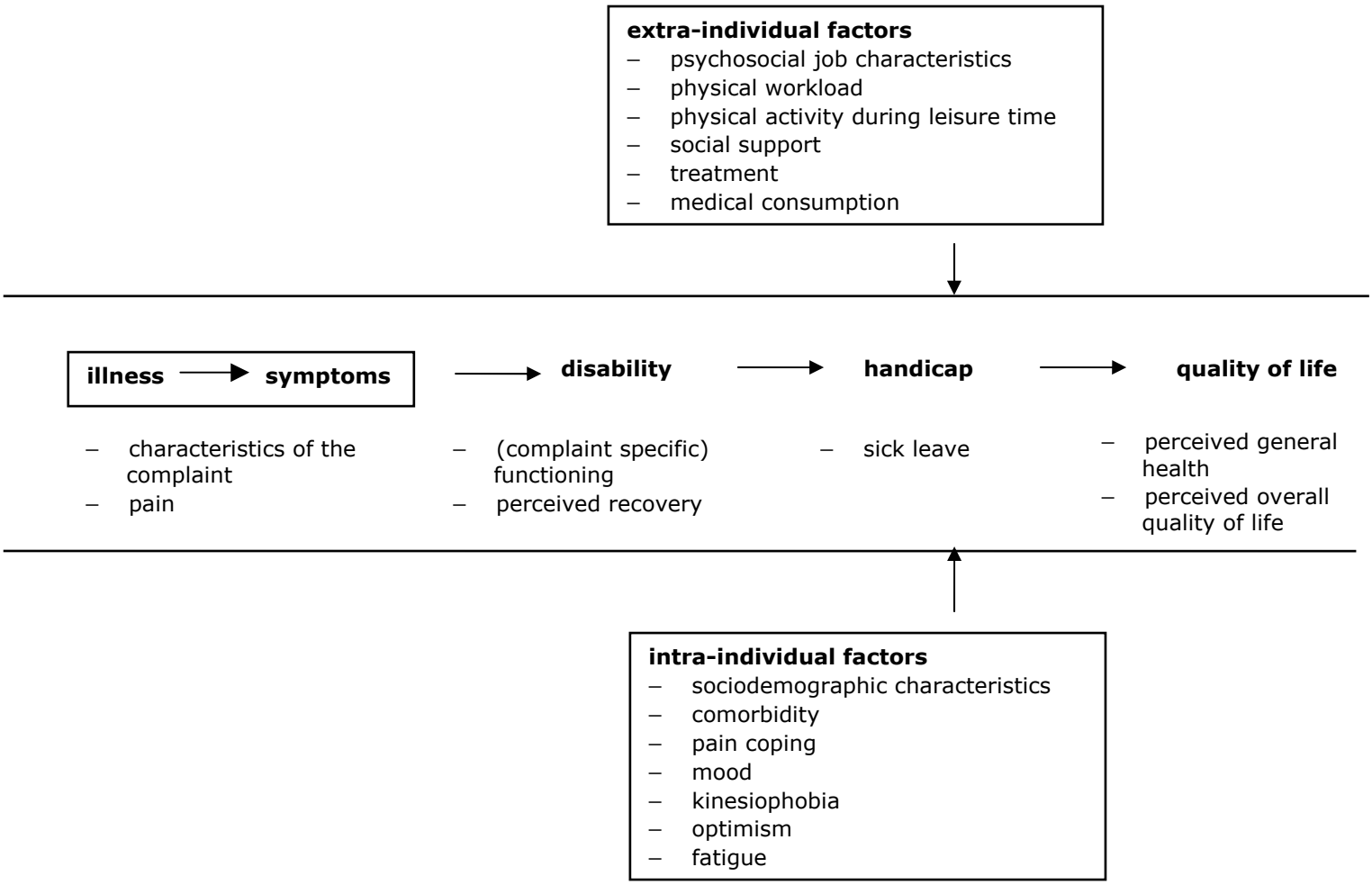
Much research has been performed on musculoskeletal complaints in general or on specific musculoskeletal conditions like osteoarthritis, osteoporosis or rheumatoid arthritis. Information about hip or knee complaints presented in general practice is relatively scarce. This thesis will fill part of this gap by presenting the results of a prospective cohort study on the course of hip and knee complaints in general practice. We studied the impact of hip and knee complaints on patients and on the workload of the GP. Concerning patients, the impact of hip and knee complaints on health related quality of life was studied, as well as the course and prognostic indicators of outcome of hip and knee complaints. Concerning GPs, the incidence and consultations rates in primary care were investigated.

Conceptual framework

We used the "disablement process" of Verbrugge[13] as a framework for studying determinants and outcomes (Figure 1). This conceptual model describes two pathways. Firstly the model illustrates how chronic and acute conditions (illnesses), expressed in symptoms, can affect disability (physical functioning), which can result in certain handicaps during daily activities, possibly resulting in worse perceived quality of life. Secondly, the model describes the intra- and extra-individual factors that can influence disablement, namely prognostic factors.

In this thesis the model is especially used to describe the course and to identify predictors of outcome in patients with a new episode of hip and knee complaints presented in general practice. As outcome measures we used perceived recovery, a change in pain intensity and a change in functioning. We studied the prognostic value of several sociodemographic variables, characteristics of the complaint, baseline scores of the outcome measures and several intra- and extra-individual factors, illustrated in the model.

Figure 1. Conceptual framework



Objectives and overview of the thesis

The main objective of this thesis was to investigate the burden of hip and knee complaints, presented in general practice. Four research questions were answered:

1. What is the incidence and consultation rate of lower extremity complaints in general practice?
2. What is the available evidence on the impact of non-traumatic hip or knee disorders on health-related quality of life (HRQL), and how does HRQL in patients with hip or knee disorders relate to the HRQL of reference populations?
3. What is the HRQL of patients with chronic hip and knee complaints in general practice?
4. What is the course of hip and knee complaints, presented in general practice and can predictors of outcome be identified?

Data from the Second Dutch National Survey of General Practice were used to calculate incidence and consultation rates of lower extremity complaints. These results are described in Chapter 2. To address research questions 2 – 4, two studies were carried out. Firstly, a systematic review was performed to summarize the available evidence on the impact of non-traumatic hip or knee disorders on health-related quality of life (HRQL). In this review, the HRQL of patients with hip and knee complaints was compared with HRQL data from reference populations. This systematic review is described in Chapter 3. Secondly, a prospective cohort study was executed in Dutch general practice, in 251 patients with knee complaints and in 139 patients with hip complaints. The protocol of this study is enclosed in Chapter 4. Since the systematic review revealed that data about the health-related and overall quality of life of patients with hip and knee complaints in general practice were scarce, we carried out a study to assess this. The impact of chronic hip and knee complaints on a disease specific quality of life questionnaire, a generic quality of life questionnaire and a question to assess overall quality of life were investigated. The results are presented in Chapter 5. Chapters 6 & 7 contain the results of the prospective cohort study regarding the course of hip and knee complaints in general practice. Furthermore, relevant predictors of outcome after three and twelve months are identified.

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Chapter 2
The incidences of and consultation rate for lower extremity complaints in general practice

Johanna M. van der Waal, Sandra D.M. Bot, Caroline B. Terwee, Daniëlle A.W.M. van der Windt, F.G. Schellevis, Lex M. Bouter, Joost Dekker

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Abstract

Background: Complaints of the lower extremities are a serious problem because of their high prevalence and substantial impact on functional disability, health care costs, sick leave and work disability. Quantifying the incidence and consultation rate of lower extremity complaints provides insight into the size and impact of these complaints. The purpose of this study was to estimate the incidence and consultation rate of lower extremity complaints in general practice.

Methods: The data originate from the second Dutch National Survey of General Practice. All contacts with patients were recorded in computerized patient records during 12 consecutive months. GPs classified the symptoms and diagnosis for each patient at each consultation according to the International Classification of Primary Care (ICPC). Incidence densities and consultation rates for different complaints were calculated.

Results: During the registration period 63.2 GP consultations per 1000 person years were attributable to a new complaint of the lower extremities. Highest incidence densities were seen for knee complaints: 21.4 per 1000 person years for women and 22.8 per 1000 person years for men. The incidence of most lower extremity complaints was higher for women than for men and higher in older age.

Discussion: Both incidences of and consultation rates for lower extremity complaints are substantial in general practice. This implies a considerable impact on the workload of the GP.

Background

Complaints of the lower extremities are a serious problem because of their high prevalence and substantial impact on functional disability, health care costs, sick leave and work disability[1-4]. A recent survey among the Dutch general population reported a 12-months period prevalence for hip pain of 12.8%, for knee pain of 21.9%, for ankle pain of 9.2% and for foot pain of 9.4%. Roughly between 30 and 40% of people reporting these complaints during the preceding year indicated that they had contacted their GP for these complaints[5].

Other population-based studies have reported the prevalence of hip or knee pain in (older) people, or hip or knee osteoarthritis (OA) specifically[6-9]. Such studies vary with regard to the age profile of their study samples but all agree that the prevalence of hip or knee complaints is highest amongst those who are over 65 years of age. Given the recent demographic changes one may expect that prevalence rates will increase in the near future. Foot problems are also a common problem, especially in the elderly, but only few studies have been published on the occurrence or impact of these problems[10].

Despite the high prevalence of lower extremity complaints in the general population, detailed information on the number of GP consultations attributable to these complaints is scarce. Musculoskeletal pain was found to be the reason for encounter in approximately 18% of the visits to health centre doctors in Finland[11] and in 9.3% in Iceland[12]. In England and Wales, 15% of all registered patients consulted their GP for a disease of the musculoskeletal system[13]. These figures refer to musculoskeletal complaints in general and do not tell us about the number of consultations for lower extremity complaints. In the Netherlands, two surveys were carried out, but those data describe incidences and prevalences of six or more years ago[14;15].

There is a need for information on the incidence of and consultation rate for lower extremity complaints. Firstly, the incidence of lower extremity complaints in general practice informs us about the burden of these complaints in the general population. That is, the number of people with new lower extremity complaints that are serious, painful or troublesome enough to seek medical care. In the Netherlands, nearly every citizen is registered in the practice of a GP. An important feature of the Dutch health care system is that patients first have to see their GP before going to a specialist. The GP acts as a gatekeeper in the health care system. Referrals to the second or third level of care can, in principle, only be made by the GP. Therefore, GP consultation rates provide a good representation of the number of people seeking medical care.

Secondly, data about the consultation rate for lower extremity complaints help to identify the patient categories that are responsible for the

GP workload due to these complaints. This information can be used to estimate the demand for health care for lower extremity complaints in general practice, and the need for education of medical students and GPs regarding these complaints. Since the population is ageing, the education of students and GPs may need some adaptations in the future concerning complaints mostly present in older adults. Only one study has presented information on the number of patients seeking medical care because of musculoskeletal complaints in relation to anatomical location, age and sex[11], but this study was carried out in rural districts in Finland. The results, therefore, may not be easily transferred to more densely populated areas in industrialised countries.

The large majority of the Dutch GPs use computerised patient records. These records provide an excellent opportunity to study the occurrence of complaints at interest in general practice. In 2001 a large survey was conducted among 195 GPs in The Netherlands (2nd Dutch National Survey of General Practice)[16;17]. The aim of our study was to use the results of this large survey to examine the current incidence of and consultation rate for lower extremity complaints in Dutch general practice.

Methods

Design

The data used in this study originate from the second Dutch National Survey of General Practice carried out by the Netherlands Institute for Health Services Research in co-operation with the National Information Network of General Practice in 2001[17]. For this survey 195 GPs in 104 practices recorded data about all contacts with patients during 12 consecutive months.

The participating GPs were distributed all over the Netherlands. They formed a representative sample of the population of all GPs in the Netherlands according to age and sex of GP, region, and location of practice (rural/urban; deprived area). Only the percentage of solo practices was smaller than in the total population of Dutch GPs[17]. The total practice population consisted of 391,294 patients at the start of the survey. The population characteristics corresponded very well with the Dutch population as a whole according to age, sex and type of health care insurance[17].

Data collection

All contacts were recorded in computerized patient records. The GPs classified the complaints or diagnosis of each patient at each consultation according to the International Classification of Primary Care (ICPC)[18]. This classification is designated by the World Organization of Family Doctors (WONCA) as the ordering principle of the family practice domains[18]. The ICPC-classification consists of a letter followed by a number. The letter stands for an organ

system (e.g. L = musculoskeletal system) and the number stands for different components, i.e. symptoms/complaints (codes 1-29), or diagnosis/diseases (codes 70-99). A selection of ICPC codes out of the L-chapter was made to identify patients with lower extremity complaints (Appendix). Sixty-one of the 104 general practices included in the study were already member of the National Information Network of General Practice before the start of the 2nd Dutch National Survey, and thus were used to ICPC-coding. All GPs were offered a course in the use of ICPC-classification before the start of the study. The GP registered whether the patient's visit concerned a new complaint, and whether it was the first or a subsequent consultation of an episode. A complaint was considered to be new if the GP regarded it as being separate from earlier problems.

Statistical analyses

To determine incidence densities we calculated the number of patients with a new lower extremity complaint in the study year, divided by the sum of person-years at risk. The incidence densities were calculated for each ICPC-code separately. Patients contributed person-years to the denominator from the start of the registration period until they consulted their GP with a new complaint of the lower extremity, after which they were no longer at risk for that specific complaint. However, they were still considered to be at risk for other lower extremity complaints (other ICPC codes). Patients who did not consult the GP for a complaint of the lower extremity contributed one person-year to the denominator. The incidence densities were calculated per 1000 person-years stratified by age, sex and type of health care insurance.

The consultation rate for lower extremity complaints was calculated as the total number of consultations for (new and chronic) lower extremity complaints divided by the population at risk (presented per 1000 registered patients). For the determination of the population at risk we used the so-called mid-time population (i.e. the mean of the total of registered persons at the start of the registration period and the total of registered persons at the end of the registration period). Finally, the number of patients who consulted their GP at least once in the study year for a lower extremity complaint divided by the population at risk was calculated.

The way people are insured may have an effect on the number of GP consultations. In the Netherlands, persons whose annual salary is below a statutory ceiling and all recipients of social security benefits have a public, compulsory health care insurance. About 64% of the Dutch population has a public insurance and about 36% have a private health care insurance[19]. Patients with public health care insurance do not pay any fee directly for consulting a GP, while private health care insurance policies usually require some co-payments for medical care. People with public health care insurance

consult the GP more often than people with a private health care insurance; it is expected that this will also be true for lower extremity complaints.

Group comparisons (i.e. men versus women; public versus private health insurance) were performed using the binomial test procedure, with significance level set at .01. Due to the large sample size we were able to use a normal approximation to the binomial distribution. We tested the null hypothesis that the two proportions were equal.

Results

Eight out of 104 practices had to be excluded from the analysis. Two had not recorded any contacts, one had registered for only three months out of the 12-months registration period and five had to be excluded due to low quality of their registration (i.e. they had registered only a part of the contacts or had not sufficiently coded the contacts according to the ICPC). The total number of patients registered in the remaining 96 general practices (i.e. the mid-time population) was 375,899.

During the registration period the GPs were consulted 53,233 times for lower extremity complaints, thus the consultation rate was 142 per 1000 registered persons. This means that in a general practice serving an average population of 2,500 patients approximately 354 consultations each year concern lower extremity complaints. In total 22,264 patients, approximately 6% of all people registered, consulted their GP at least once in the study year with a complaint of the lower extremities.

The incidences and consultation rates of lower extremity complaints per ICPC-code are presented in Table 1 and Table 2, respectively. During the registration period 63.2 GP consultations per 1000 person years were attributable to a new complaint of the lower extremities. The incidences and the consultation rates of lower extremity complaints were much higher for patients with public health care insurance than for privately insured patients (incidence 69.5 versus 51.7, $p<0.01$, consultation rate 159.3 versus 108.7, $p<0.01$). When studying the incidence of complaints and diagnoses of the same anatomical location, we can see that the most commonly presented lower extremity complaint in general practice was a knee complaint, for both men (22.8 per 1000 person years) and women (21.4 per 1000 person years).

Table 1 – Incidences of lower extremity complaints in general practice

		incidence [95% CI] (per 1000 person years)									
		health insurance				sex					
ICPC*	**Complaint / Diagnosis**	**public**		**private**		**men**		**women**		**total**	
L13	Hip Complaints	5.8	[5.5-6.1]	4.4†	[4.1-4.8]	3.8	[3.6-4.1]	6.8†	[6.4-7.2]	5.3	[5.1-5.6]
L14	Leg/Thigh Complaints	10.1	[9.7-10.5]	6.3†	[5.9-6.7]	7.3	[6.9-7.6]	10.3†	[9.9-10.8]	8.8	[8.5-9.1]
L15	Knee Complaints	15.5	[15.0-16.0]	11.9†	[11.3-12.5]	14.2	[13.7-14.8]	14.2	[13.7-14.7]	14.2	[13.8-14.6]
L16	Ankle Complaints	3.9	[3.6-4.1]	2.6†	[2.4-2.9]	3.3	[3.1-3.6]	3.5	[3.3-3.8]	3.4	[3.2-3.6]
L17	Foot/Toe Complaints	15.1	[14.7-15.6]	10.9†	[10.3-11.5]	11.5	[11.0-11.9]	15.8†	[15.3-16.4]	13.7	[13.3-14.0]
L77	Sprain of Ankle/Foot	8.2	[7.8-8.5]	6.4†	[6.0-6.8]	7.3	[6.9-7.7]	7.8	[7.4-8.2]	7.6	[7.3-7.8]
L78	Sprain/Strains of Knees	3.8	[3.6-4.1]	3.2†	[2.9-3.5]	4.0	[3.7-4.3]	3.2†	[3.0-3.5]	3.6	[3.4-3.8]
L89	Osteoarthritis Hip	1.0	[0.9-1.1]	0.8†	[0.7-1.0]	0.6	[0.5-0.8]	1.2†	[1.1-1.4]	0.9	[0.8-1.0]
L90	Osteoarthritis Knee	1.6	[1.5-1.8]	1.1†	[1.0-1.3]	0.9	[0.8-1.0]	2.0†	[1.8-2.2]	1.5	[1.3-1.6]
L96	Acute Meniscus/Ligament Knee	1.4	[1.3-1.6]	1.2†	[1.0-1.4]	1.7	[1.5-1.9]	1.0†	[0.8-1.1]	1.3	[2.2-1.5]
L97	Chronic Internal Knee Derangement	3.1	[2.8-3.3]	2.8†	[2.5-3.1]	2.9	[2.7-3.1]	3.0	[2.8-3.3]	3.0	[2.8-3.1]
	Total	69.5	[68.5-70.5]	51.7†	[50.5-52.9]	57.5	[56.4-58.5]	69.0†	[67.8-70.1]	63.2	[62.5-64.0]

International Classification of Primary Care

†*statistically significant different incidence between public and private insurance or between men and women (p<0.01)*

Table 2 –Consultation rates for lower extremity complaints in general practice

		Consultation rate [95%CI] (per 1000 registered patients)									
		health insurance				sex					
ICPC*	**Complaint / Diagnosis**	**public**		**private**		**men**		**women**		**total**	
L13	Hip Symptoms/Complaints	14.8	[14.3-15.2]	10.3†	[9.8-10.9]	8.7	[8.3-9.1]	17.7†	[17.1-18.3]	13.2	[12.8-13.6]
L14	Leg/Thigh Symptoms/Complaints	22.9	[22.4-23.5]	12.7†	[12.1-13.3]	15.2	[14.7-15.8]	23.4†	[22.7-24.1]	19.3	[18.9-19.8]
L15	Knee Symptoms/Complaints	34.1	[33.4-34.8]	23.7†	[22.9-24.6]	28.9	[28.1-29.6]	32.0†	[31.2-32.8]	30.5	[29.9-31.0]
L16	Ankle Symptoms/Complaints	7.9	[7.5-8.2]	5.1†	[4.7-5.5]	6.2	[5.8-6.6]	7.6†	[7.2-8.0]	6.9	[6.6-7.2]
L17	Foot/Toe Symptoms/Complaints	27.9	[27.3-28.6]	19.3†	[18.5-20.0]	20.0	[19.4-20.7]	29.7†	[28.9-30.5]	24.9	[24.4-25.4]
L77	Sprain of Ankle/Foot	15.9	[15.4-16.4]	12.6†	[12.0-13.2]	13.9	[13.4-14.4]	15.6†	[15.0-16.1]	14.8	[14.4-15.1]
L78	Sprain/Strains of Knees	7.0	[6.7-7.4]	5.4†	[5.0-5.8]	6.9	[6.5-7.3]	6.0†	[5.7-6.4]	6.4	[6.2-6.7]
L89	Osteoarthritis Hip	7.3	[6.9-7.6]	4.9†	[4.5-5.3]	3.8	[3.5-4.1]	9.1†	[8.6-9.5]	6.4	[6.2-6.7]
L90	Osteoarthritis Knee	10.5	[10.1-10.9]	6.0†	[5.5-6.4]	4.5	[4.2-4.8]	13.2†	[12.7-13.7]	8.9	[8.6-9.2]
L96	Acute Meniscus/Ligament Knee	3.4	[3.2-3.7]	2.8†	[2.5-3.1]	3.9	[3.6-4.1]	2.6†	[2.4-2.8]	3.2	[3.0-3.4]
L97	Chronic Internal Knee Derangement	7.6	[7.3-8.0]	5.9†	[5.5-6.4]	6.4	[6.0-6.8]	7.7†	[7.3-8.0]	7.0	[6.8-7.3]
	Total	159.3	[157.9-160.8]	108.7†	[107.0-110.4]	118.4	[116.9-119.8]	164.5†	[162.9-166.2]	141.6	[140.5-142.7]

International Classification of Primary Care

†*statistically significant different consultation rate between public and private insurance or between men and women (p<0.01)*

Table 3 Incidences (per 1000 person years) of lower extremity complaints in general practice by ICPC codes, age groups and sex

			Age group								
ICPC**	**Complaint / Diagnosis**	**sex**	**0-9 [95%CI]**	**10-19 [95%CI]**	**20-29 [95%CI]**	**30-39 [95%CI]**	**40-49 [95%CI]**	**50-59 [95%CI]**	**60-69 [95%CI]**	**70-79 [95%CI]**	**80 + [95%CI]**
L13	Hip Complaints	men	4.0 [3.2-4.8]	2.1 [1.5-2.7]	1.6 [1.1-2.1]	2.2 [1.7-2.8]	3.2 [2.5-3.8]	5.6 [4.7-6.5]	5.9 [4.7-7.1]	9.0 [7.1-10.9]	16.0 [11.9-20.1]
		women	4.9 [3.9-5.8]	2.2 [1.6-2.8]	3.6* [2.9-4.4]	4.0* [3.3-4.6]	6.3* [5.4-7.2]	8.6* [7.4-9.8]	13.1* [11.4-14.9]	15.4* [13.3-17.5]	18.3 [15.3-21.4]
L14	Leg/Thigh Complaints	men	4.1 [3.3-4.9]	5.1 [4.2-6.0]	5.2 [4.3-6.1]	5.1 [4.3-5.8]	8.1 [7.0-9.1]	9.4 [8.2-10.6]	12.5 [10.7-14.2]	13.8 [11.4-16.1]	15.5 [11.5-19.5]
		women	4.2 [3.4-5.1]	4.3 [3.4-5.1]	6.2 [5.2-7.1]	7.4* [6.4-8.3]	10.5* [9.3-11.7]	14.4* [12.8-15.9]	17.3* [15.3-19.3]	22.1* [19.6-24.6]	25.3 [21.7-28.9]
L15	Knee Complaints	men	3.6 [2.8-4.3]	17.0 [15.3-18.6]	15.5 [14.0-17.0]	15.1 [13.7-16.4]	16.9 [15.4-18.4]	17.8 [16.1-19.4]	14.3 [12.4-16.1]	12.0 [9.8-14.1]	9.9 [6.7-13.1]
		women	2.7 [2.1-3.4]	16.7 [15.0-18.3]	10.8* [9.6-12.1]	10.0* [8.9-11.1]	15.5 [14.1-16.9]	19.5 [17.7-21.3]	18.9* [16.8-21.0]	24.0* [21.4-26.7]	21.4 [18.1-24.7]
L16	Ankle Complaints	men	2.4 [1.8-3.0]	5.3 [4.4-6.2]	4.8 [3.9-5.6]	2.9 [2.3-3.5]	3.2 [2.6-3.9]	2.4 [1.8-3.0]	2.5 [1.7-3.3]	3.1 [2.0-4.3]	1.9 [0.5-3.3]
		women	1.9 [1.3-2.5]	5.0 [4.1-5.9]	3.5 [2.8-4.2]	3.4 [2.7-4.0]	2.9 [2.3-3.5]	3.8* [3.0-4.6]	3.7 [2.8-4.7]	4.4 [3.3-5.6]	4.2* [2.7-5.7]
L17	Foot/Toe Complaints	men	9.2 [8.0-10.4]	16.2 [14.6-17.8]	9.7 [8.5-10.9]	8.4 [7.4-9.4]	10.9 [9.7-12.1]	12.8 [11.4-14.3]	12.5 [10.8-14.3]	14.8 [12.4-17.2]	17.7 [13.4-22.0]
		women	8.5 [7.2-9.7]	14.3 [12.7-15.8]	11.8 [10.5-13.1]	14.3* [13.0-15.7]	15.5* [14.0-16.9]	22.6* [20.6-24.5]	21.7* [19.4-23.9]	22.6* [20.1-25.2]	19.4 [16.3-22.6]
L77	Sprain of Ankle/ Foot	men	3.6 [2.8-4.3]	15.4 [13.8-17.0]	12.1 [10.7-13.4]	8.3 [7.3-9.3]	6.5 [5.5-7.4]	4.0 [3.3-4.8]	2.2 [1.4-2.9]	1.9 [1.0-2.7]	1.6 [0.3-3.0]
		women	3.8 [3.0-4.6]	16.4 [14.7-18.0]	8.8* [7.7-9.9]	7.6 [6.6-8.5]	7.4 [6.4-8.4]	7.5 [6.4-8.6]	6.3* [5.0-7.5]	4.1* [3.0-5.2]	3.7 [2.3-5.1]
L78	Sprain/Strains of Knees	men	0.9 [0.54-1.33]	6.0 [5.0-7.0]	5.5 [4.6-6.5]	4.5 [3.7-5.2]	4.5 [3.7-5.2]	3.4 [2.7-4.2]	3.0 [2.1-3.8]	2.8 [1.8-3.9]	2.2 [0.7-3.7]
		women	0.4 [0.1-0.7]	3.7* [2.9-4.5]	4.0* [3.2-4.7]	2.6* [2.0-3.2]	3.6 [2.4-4.3]	3.5 [2.8-4.3]	3.9 [2.9-4.8]	4.6 [3.4-5.8]	3.4 [2.1-4.7]
L89	Osteoarthritis Hip	men	0	0	0	0	0.3 [0.1-0.5]	1.1 [0.7-1.6]	2.3 [1.5-3.1]	3.6 [2.4-4.7]	4.1 [2.0-6.2]
		women	0	0	0	0	0.3 [0.1-0.5]	1.8 [1.2-2.3]	4.4* [3.4-5.5]	5.8 [4.5-7.1]	5.0 [3.4-6.6]
L90	Osteoarthritis Knee	men	0	0	0	0.1 [-0.0-0.1]	0.5 [0.3-0.8]	1.6 [1.1-2.0]	2.8 [1.9-3.6]	4.6 [3.2-6.0]	6.6 [4.0-9.2]
		women	0	0	0	0.1 [-0.0-0.2]	0.5 [0.2-0.8]	2.5 [1.8-3.1]	5.6* [4.5-6.8]	9.8* [8.1-11.5]	12.7* [10.1-15.2]
L96	Acute Meniscus/ Ligament Knee	men	0.1 [-0.03-0.2]	1.2 [0.8-1.7]	2.0 [1.4-2.5]	2.6 [2.0-3.1]	2.4 [1.8-2.9]	2.3 [1.7-2.9]	1.1 [0.6-1.6]	0.7 [0.2-1.3]	0
		women	0	0.8 [0.5-1.2]	1.0* [0.6-1.4]	1.0* [0.6-1.4]	1.1* [0.7-1.5]	1.8 [1.3-2.4]	1.6 [1.0-2.3]	0.7 [0.2-1.2]	0.3 [-0.1-0.6]
L97	Chronic Int Knee Derangement	men	0.4 [0.1-0.6]	4.3 [3.4-5.1]	3.5 [2.7-4.2]	3.8 [3.1-4.4]	3.3 [2.6-3.9]	3.2 [2.5-3.9]	2.4 [1.6-3.1]	1.0 [0.4-1.7]	0.8 [-0.1-1.7]
		women	0.6 [0.3-0.9]	7.0* [5.9-8.1]	3.3 [2.6-3.9]	2.9 [2.3-3.5]	3.1 [2.5-3.8]	3.4 [2.7-4.2]	2.5 [1.7-3.2]	1.4 [0.8-2.0]	0.7 [0.1-1.3]

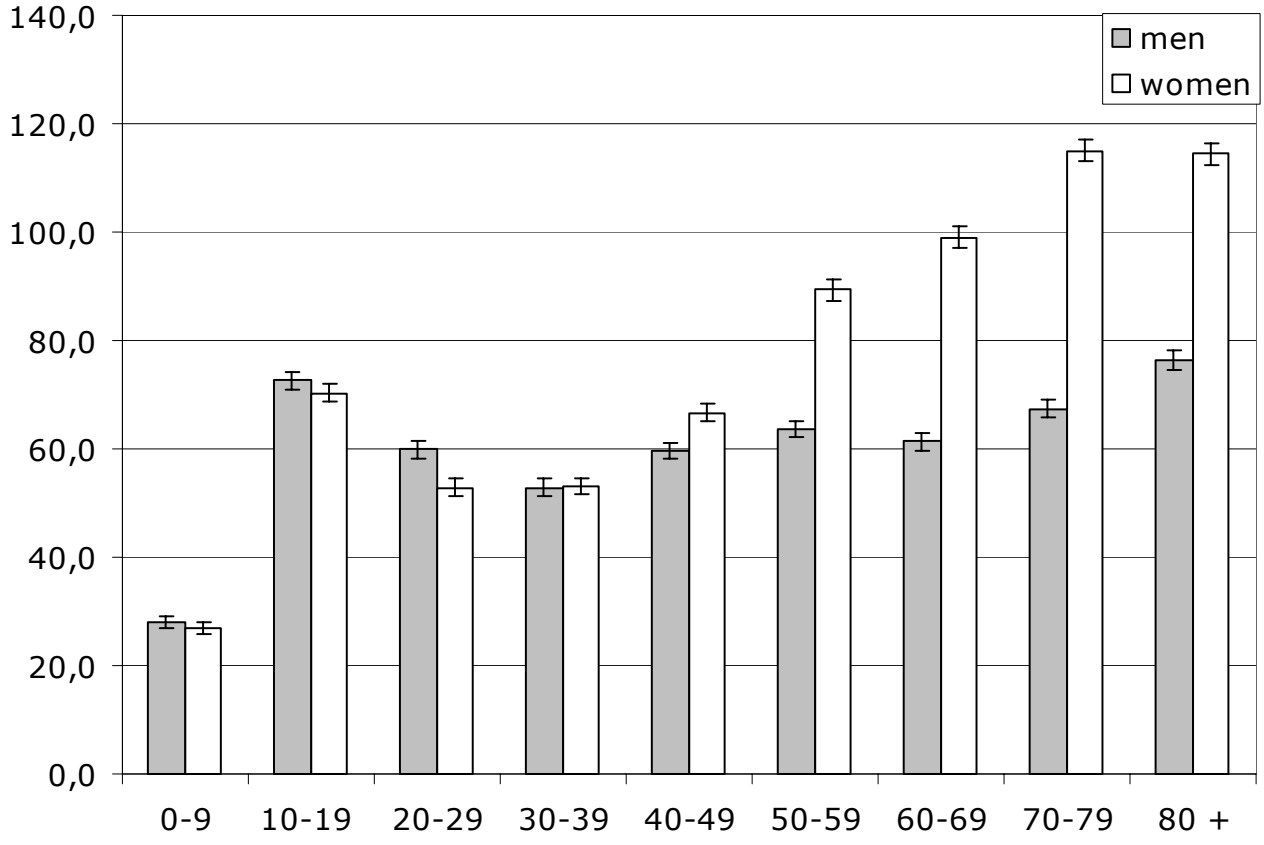
**International Classification of Primary Care*

**statistically significant different incidence between men and women (p<0.01)*

Table 3 shows sex and age specific incidences. The incidence of most lower extremity complaints was higher for women than for men ($p<0.01$), with only a few exceptions. The incidence of knee symptoms, sprains of the ankle/foot, sprains of the knee, and acute meniscus / ligament knee was higher in men in most of the younger age-categories ($p<0.01$). Incidences also varied according to age. Under the age of 30 a high incidence was seen for knee and ankle complaints, especially in men. Above the age of 50, a high incidence was seen for knee and foot/toe complaints. OA of the knee and hip were incident in patients above the age of 40. Knee OA had a higher incidence than hip OA, especially in women.

The total incidence of lower extremity complaints (all ICPC codes taken together) varied according to sex and age (Figure 1). A total of 55% of the patients with a complaint of the lower extremities were women. The age related patterns were different for men and women. In women the incidence increased with age, with an additional peak at the age group of 10-19. In men the incidence was high in the age group of 10-19, then decreased and increased slightly from the age group of 60-69. In the age groups of 50-59 and older, the incidence in women was much higher than in men.

Figure 1. Sex and age specific incidences of lower extremity complaints in general practice
(error bars indicate Standard Errors)



Discussion

In the present study, the incidence of and consultation rate for lower extremity complaints in general practice has been estimated. The results show that the incidence was high: 63.2 per 1000 person years (57.5 for men and 69.0 for women). Highest incidences were seen for patients with knee complaints: 21.4 per 1000 person years for women and 22.8 per 1000 person years for men.

The incidences for the various complaints varied according to age. Both in men and women ankle complaints were higher in younger age and leg, knee, hip and foot/toe complaints were higher in older age with an additional peak for knee complaints at younger age, especially in men. These differences can be explained by the fact that at younger age most complaints concern injuries during exercise or sports (meniscal injuries and ankle sprains). The high incidence of knee complaints at older age, especially in women, may reflect degenerative joint disease that has not yet been coded as such. GPs may have coded those first presentations as hip or knee complaints instead of diagnosing these complaints.

Consultation rates for lower extremity complaints were also high. GPs were visited 142 times per 1000 registered persons in the study year. Approximately 6% of all people registered, consulted their GP at least once in the study year with a complaint of the lower extremities. These figures indicate a considerable impact of lower extremity complaints on the workload of the GP. This is in contrast with the small amount of time that is dedicated to these problems during the education of medical students and GPs. Since the population is ageing, the education of students and GPs may need some adaptations in the future concerning lower extremity complaints, which are mostly present in older adults.

The figures in our study are somewhat lower than the self-reported consultation rates reported by Picavet et al[5] in which 6-9% of the responders with lower extremity complaints reported contact with their GP. An explanation for this difference can be an overestimation reported in the study by Picavet. Another explanation can be the fact that during contact with the GP, subjects in the study by Picavet reported these complaints not as their main complaints but as an additional complaint. In our study, these would not have been included because the GPs only coded the main complaints that were reported during consultation.

As expected, type of health care insurance had an effect on the incidence and consultation rate: patients with a public health care insurance consulted their GP more often for lower extremity complaints and had a higher incidence for these complaints than patients with private health care insurance. This may be explained by the fact that private health care insurance policies usually require some co-payments for medical care and this may be a threshold for GP consultation. As type of health care insurance depends on income level, it may

be used as a proxy measure of socio-economic status. Persons with lower socio-economic status are associated with a worse overall health status[20;21] and suffer more often from musculoskeletal pain[22-24]. Finally, they have been shown to consult the general practitioner more often compared to those with a high socio-economic status[25;26]. Thus, the higher incidence and consultation rate may be due to a worse health in patients with public health care insurance.

The incidences of our study can be compared to incidences from the first Dutch National Survey of General Practice in the Netherlands. In that study, 161 GPs registered every contact during 3 consecutive months in 1987[27]. Although the design of the second National Survey resembles the first one, there are several differences. Firstly, in the first National Survey the contacts were recorded on standardised forms, instead of using computerised medical records. Secondly, the morbidity data were not coded by the GP, but afterwards by trained personnel. For this classification a modified version of the International Classification of Primary Care (ICPC-codes) was used. A comparison of similar ICPC-codes reveals higher incidence rates for codes representing complaints and lower incidence rates for codes representing diagnoses in the second National Survey. This may indicate that the trained personnel in the first National Survey used more often codes representing diagnoses instead of complaints. The total incidence of lower extremity complaints presented in the first national survey was 54 per 1000 person years[14], which is lower than the incidence found in this second National Survey (63 per 1000 person years). We may conclude that the incidence of lower extremity complaints has increased over the past 13 years. This increase can be explained by the ageing of the population in western countries. Most lower extremity complaints are more common among older people and with a growing older population, the incidences are expected to rise further in the near coming future.

Analysing trends over time, the results of our study can also be compared to data from the Transition Project[15]. In the Transition Project, 54 Dutch GPs in 23 locations routinely coded episode data for all direct (face-to-face) encounters with their listed patients from 1985 to 1995. Each participating GP collected data during a period of at least 1 year. Most incidence densities found in our study are comparable to the ones found in the Transition project, but a remarkable difference can be seen for the incidence of osteoarthritis. In the present study, the incidence of hip and knee osteoarthritis together was 2.4 per 1000 person years. In the Transition Project, the incidence of peripheral arthritis was 14.2. An explanation for this difference can be the fact that the code used in the Transition Project comprises osteoarthritis in all joints and not only in the hip or knee. Another explanation can be an underestimation of osteoarthritis in the hip and knee in our study because the GPs may have coded those cases as hip or knee

complaints (codes L13 and L15) instead of diagnosing these complaints as hip or knee osteoarthritis (codes L89 and L90). This is reflected in the fact that incidence densities for codes L13 and L15 were somewhat higher in our study than in the Transition Project.

The incidences and consultation rates found in this study inform us about the number of people with lower extremity complaints that are serious, painful or annoying enough to seek medical care. The figures show that these numbers are substantial. These findings are in agreement with the attempt that is being made to increase the attention of GPs on this kind of complaints[28]. The western population is ageing and more people suffer from lower extremity complaints, especially knee pain. Since knee pain has a substantial impact on people's lives and on their use of primary health-care[29], the need to identify practical and effective means of reducing this burden should be a priority for research and development in primary care.

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Appendix

INTERNATIONAL CLASSIFICATION OF PRIMARY CARE (ICPC) CODES, Chapter L - Musculoskeletal
(ICPC codes selected for inclusion in the present study are shown in italic and bold)

L01 Neck Symptoms/Complaints
L08 Shoulder Symptoms/Complaints
L09 Arm Symptoms/Complaints
L10 Elbow Symptoms/Complaints
L11 Wrist Symptoms/Complaints
L12 Hand/Finger Symptoms/Complaints
L13 Hip Symptoms/Complaints
L14 Leg/Thigh Symptoms/Complaints
L15 Knee Symptoms/Complaints
L16 Ankle Symptoms/Complaints
L17 Foot/Toe Symptoms/Complaints
L18 Muscle Pain/Fibrositis
L19 Other Symptoms, Multiple/Unspecified Muscle
L20 Symptoms Multiple/Unspecified Joints
L28 Disability/Impairment
L29 Other & Multiple Musculoskeletal Symptoms
L77 Sprain Of Ankle/Foot
L78 Sprains/Strains of Knees
L79 Sprains/Strains Other Joints
L80 Dislocations
L81 Other Injury Musculoskeletal
L83 Syndrome Of Cervical Spine
L84 Osteoarthritis Spine
L85 Acquired Deformities Of Spine
L87 Ganglion Joint/Tendon
L88 Rheumatoid Arthritis
L89 Osteoarthritis Hip
L90 Osteoarthritis Knee
L91 Other Osteoarthritis
L92 Shoulder Syndrome
L93 Tennis Elbow
L94 Osgood-Schlatter, Osteochondritis
L95 Osteoporosis
L96 Acute Meniscus/Ligament Knee
L97 Chronic Internal Knee Derangement
L98 Acquired Deformities Limbs
L99 Other Musculoskeletal/Connective Disorder

Chapter 3
The impact of non-traumatic hip and knee disorders on health related quality of life as measured with the SF-36 or SF-12. A systematic review

Johanna M. van der Waal, Caroline B. Terwee, Daniëlle A.W.M. van der Windt, Lex M. Bouter, Joost Dekker

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Abstract

Objectives. The purpose of this review is to summarize the available evidence on the impact of non-traumatic hip or knee disorders on health-related quality of life (HRQL), as measured with the Short Form 36 Health Survey (SF-36) or Short Form 12 Health Survey (SF-12), by comparing this with data from reference populations.
Methods. Studies were identified by an electronic search of the MEDLINE, PsychInfo and Cinahl databases. Studies with the following features were included: study population included patients with non-traumatic hip or knee disorders, the SF-36 or SF-12 was used as an outcome measure and mean scores on these HRQL measures were presented. Using mean HRQL-scores from the selected studies and scores from reference populations, z-scores were computed. Pooled estimates were computed for subgroups of studies with similar patients in similar settings.
Results. A total of 40 studies met the inclusion criteria. Patients with non-traumatic hip and knee disorders scored up to 2.5 standard deviations (SD) below reference population values, especially on the physical aspects of HRQL. Social and mental aspects were up to 1 SD below reference population values, especially in patients in clinical settings.
Conclusions. The impact of non-traumatic hip or knee disorders on HRQL is substantial, especially on the physical aspects of HRQL.

Introduction

Hip and knee disorders are a frequent health problem. Estimates of the prevalence of osteoarthritis (OA) depend on variations in definition, but OA is thought to affect more than 10-12% of the population in the United States (US)[1]. The 12-months period prevalence of hip and knee disorders among adults in the general population in the Netherlands is estimated at 28%[2]. The prevalence increases with age[2]. In the Netherlands, every year 10 per 1000 persons visit their general practitioner (GP) with a new episode of hip complaints and 31 per 1000 persons with a new episode of knee complaints[3].

Hip and knee disorders have substantial consequences for public health, because of their strong impact on functional disability, health care costs, sick leave and work disability[4-7]. The United Nations, the World Health Organization (WHO), governments, professional and patients' organizations have therefore declared 2000-2010 the Bone and Joint Decade, with the aim of determining the burden of musculoskeletal diseases and improving the health related quality of life of people with musculoskeletal conditions. Quantifying the health burden of disorders is critical to decisions involving the allocation of limited health care resources.

The burden of a disease relates not only to its incidence and prevalence, but also to the impact of the disease on the (health-related) quality of life (HRQL) of the patients who suffer from it[8-10]. It is generally agreed upon that HRQL encompasses several different dimensions including physical, emotional and social functioning[11]. To facilitate interpretation of HRQL data and to put population scores into perspective, generic instruments, such as the Short Form 36 Health Survey (SF-36), are usually best suited: generic measures facilitate comparisons of scores with those from a reference population, and enable a comparison of HRQL across different disease groups.

Although HRQL in patients with hip and knee disorders has been studied extensively using generic instruments, a systematic review about the impact of hip and knee disorders, such as osteoarthritis, rheumatoid arthritis, bursitis, or non-specific hip or knee pain, on HRQL is not yet available.

By pooling the results of separate studies, a more precise estimate of the impact on HRQL can be made. The purpose of this review was to summarize the available evidence on the impact of non-traumatic hip or knee disorders on health-related quality of life (HRQL). In order to facilitate interpretation of the results and to quantify the impact of hip and knee complaints on HRQL, we wanted to compare patient scores with reference data from the general population. An extensive search of the literature showed that the SF-36 and SF-12 were the only instruments for which reliable country-specific reference data were available. Therefore, we only included studies that used the SF-36 or SF-12 to assess HRQL in our systematic review.

Methods

Search strategy and study selection

The SF-36[12] and SF-12[13] are the most commonly used generic HRQL measures in patients with hip or knee disorders. We conducted a systematic literature search to identify studies measuring HRQL, using the SF-36 or SF-12, in patients with non-traumatic hip or knee disorders. Publications were selected from the following databases: Medline (1966 until January 2003), PsycINFO (1977 until January 2003) and Cinahl (1982 until January 2003). No language restrictions were imposed.

The search terms used were (*SF-36* or *SF-12* or *SF-36* and *SF-12* or *"short form-36"* or *"short form-12"* or "*Short Form 36 Health Survey*" or "*Short Form thirty-six health survey*" or "*Short Form 12 Health Survey*" or "*Short Form twelve health survey*") plus *hip* or *knee* (MESH or free text word). The following criteria were used for inclusion of studies in the review:

- The study population consists of patients with non-traumatic hip or knee disorders.
- HRQL, defined as physical, emotional or social functioning, is measured using the SF-36 or SF-12.
- The mean scores of patients with non-traumatic hip or knee disorders on the SF-36 or SF-12 are presented in the article.

The following criteria were used for exclusion of studies from the review:

- The study population consists of patients after surgery. Our aim was to quantify the impact of a disorder and not the impact of a treatment.
- The study population consists of patients with traumatic injuries.
- The study population contains fewer than 100 patients with non-traumatic hip or knee disorders. This is an arbitrary cut-off point, but a sample of at least 100 persons will provide more reliable estimates of HRQL.
- The study population consists of patients participating in a (randomized) clinical trial (RCT). Due to strict selection criteria these patients are often not representative for members of the general population or patients encountered in everyday primary or secondary care.

The first author screened all titels, in order to exclude articles that obviously did not meet the selection criteria. Two independent reviewers (DW and JW) scanned all remaining abstracts. During a consensus meeting all abstracts that appeared to meet the selection criteria were selected. The full text of these articles was retrieved to select articles that met all selection criteria. When multiple articles used the same data, we included the most recent or most complete article. Finally, we handsearched the reference lists of all included articles to find additional eligible studies.

Data extraction

We extracted data from each article on the following study characteristics: mean age of the study population, study size, country, setting, and case definition (diagnosis, disease stage). Extracted mean HRQL scores were entered into a custom-made spreadsheet.

To examine the impact of hip and knee disorders on HRQL we compared the scores on the SF-36 or SF-12 with scores obtained from country-specific reference populations[14-23]. These reference populations consist of a representative sample from the general population and are usually used as normative data. If possible, age- and sex-specific reference data were used. Details about which reference populations were used are provided in the Results section.

Data analysis

We computed z-scores for each subscale of the SF-36 or SF-12 by dividing the difference between the mean HRQL score of the patient group and the mean HRQL score of the reference population by the standard deviation of the mean HRQL score of the reference population. We cmoputed z-scores for the SF-36 Physical Component Summary (PCS) and Mental Component Summary (MCS) in the same way. The use of z-scores ("norm-based scoring") has been recommended by the developers of the SF-36 [24]. To compute z-scores, we used country-specific normative data whenever available. Tables 1-3 show which data were used to compute z-scores for each individual study.

No reference data from Switzerland were available. Instead, we used data from a French population[15]. Since France is a neighbouring country and a substantial number of inhabitants speak the same language, we thought these reference data were most suitable. When a study was conducted in multiple countries, reference data were used from the country that represented most patients. Lingard et al[25] performed a multicentre study in the UK (six centres), the US (four centres) and Australia (two centres). Most centres were in the UK so reference data from an English population were used[14]. Mahomed et al[26] performed a study in the US and Canada. As most patients were from the US (60%), the American reference data for the SF-36[17] and the SF-12[22] were used.

Clark et al[27] used the SF-36 PCS and MCS to assess HRQL among male outpatients in the US. As no sex-specific reference data are available for SF-36 PCS and MCS scores, we used the available reference data from a representative sample of the American population[22]. Spanish reference data for the SF-36 were sex-specific. For the study by Escobar et al[28] we decided to use female reference data from Spain[23], because most patients in this Spanish study were female (TKA 56% and THA 71%).

Data synthesis and presentation

Results are presented separately for hip and knee disorders (if possible) and for the following study settings: general population, community-dwelling elderly, primary care, clinic (hip or knee OA), and in patients prior to total hip arthroplasty (THA) or total knee arthroplasty (TKA). For studies concerning similar patient populations (with respect to diagnosis or mean age) and similar settings, pooled estimates were computed for separate dimensions of SF-36 or SF-12, weighted by study size. Studies among community-living elderly showed many differences regarding characteristics of the patient population (case definition, setting or age). Consequently, we refrained from computing pooled Z-scores for these studies. We pooled two studies concerning patients with knee or hip OA in clinical settings (data from hip and knee patients were not presented separately in these studies)[29,30], three studies on patients with knee OA in clinical settings[31-33], two studies on patients with knee or hip OA, admitted or scheduled for TKA or THA (data from hip and knee patients were also not presented separately in these studies)[34,35], nineteen studies on patients with knee OA admitted or scheduled for TKA[25,26,28,33,36-50] and twenty-three studies on patients with hip OA admitted or scheduled for THA[26,28,36,39-46,48-59]. Deviations of more than 0.5 SD from the reference population (z-score < -0.5) were considered clinically important, based on recent guidelines for HRQL research[60].

Results

Search

The results of our search strategy are presented in Figure 1. The search strategy identified 323 abstracts. After initial selection by the first author 126 abstracts were excluded.Two independent reviewers assessed the remaining 197 abstracts. Another 135 abstracts were excluded. For the remaining 62 abstracts the full text article was retrieved. Twenty-two of these 62 articles were excluded. Forty articles contained mean scores from the SF-36 or SF-12, and were included in the review. Handsearching the reference lists of these 40 articles did not result in the identification additional relevant articles.

Characteristics of the study populations

The studies contained data about the HRQL of patients with hip and knee disorders in five different settings. Of the 40 studies we included, one study concerned patients in the general population[61] (223 patients), three studies concerned community living elderly[27,62,63] (in total 133,358 patients), one study concerned patients in a primary care setting[64] (195 patients), five studies concerned patients in clinical settings[29-33] (in total 1407 patients) and thirty studies concerned patients with OA admitted or scheduled for total arthroplasty (in total 5191 patients admitted for TKA[25,26,28,33,36-50,65] and 4236

patients admitted for THA[26,28,36,39-46,48-59]) The characteristics of these studies are described in Tables 1-3. One article[33] describes HRQL of patients in clinical settings and of patients prior to TKA and therefore appears in Table 2 and Table 3.

The study in the general population concerned patients with symptomatic knee osteoarthritis. The studies concerning community-living elderly included patients with knee pain, or knee or hip osteoarthritis. The study in primary care concerned patients presenting with new episodes of hip pain. The studies in outpatient clinics, rheumatology and rehabilitation clinics or tertiary hospitals, all included patients with hip or knee osteoarthritis or patients prior to TKA or THA.

Figure 1. Study selection

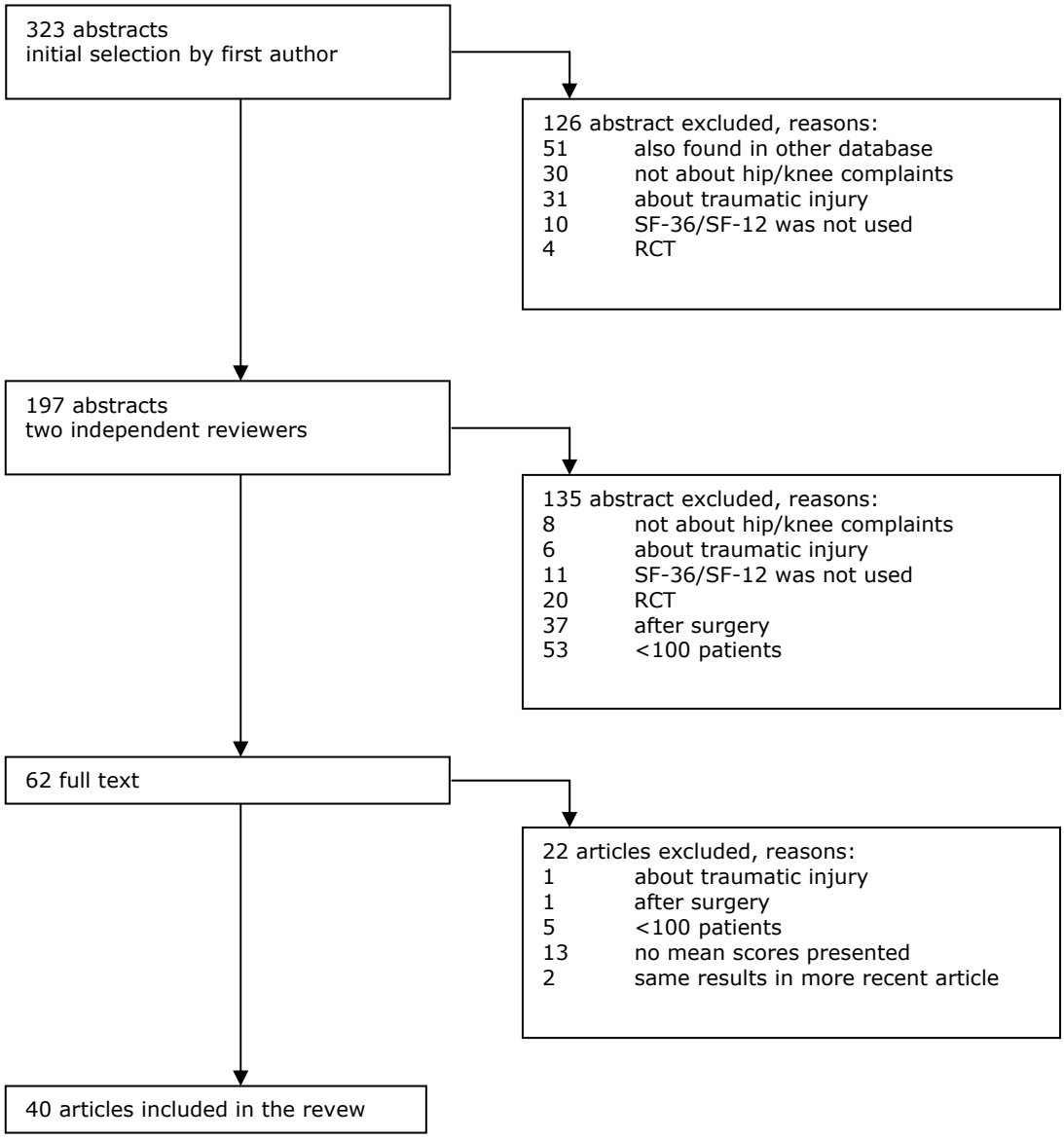


Table 1 –Studies in the general population, among community-living elderly or in primary care

Author, Year [Reference]	n	Age mean (SD) range	country	Setting	Case definition	Reference data
Birrell et al, 2000 [64]	195	63 (11)	UK	General practice and primary care rheumatology	Patients presenting with new episodes of hip pain in primary care	Representative sample of population aged 16 and over living in private households in the UK[14]
Carmona et al, 2001 [61]	223	≥ 20	Spain	General population	Symptomatic knee OA, ACR classification criteria	Representative sample of Spanish population[22]
Clark et al, 1998 [27]	415 men	median 66 22-90	US	Male outpatients at Veterans Affairs medical centres	Knee OA according to three-questions	Representative sample of US population[22]
Cooper et al, 2001 [62]	132514	74 (6.1) 65-108	US	Medicare beneficiaries, aged 65 and older; community living elderly	Arthritis of hip or knee, diagnosis based on symptoms, and co-morbidity	Representative sample of US population[22]
Wilcox et al, 2000 [63]	429	72 (5.0) 65-88	US	Elderly enrolled in the Observational Arthritis Study in Seniors (community-based study)	Knee pain, or knee pain with radiographic evidence of OA	US general population norms[17]

SD: standard deviation, UK: United Kingdom, US: United States, OA: osteoarthritis, ACR: American College of Rheumatology

Table 2 –Studies in outpatient clinics and other clinical settings

Author, Year [Reference]	n	Age mean (SD) range	country	Setting	Case definition	Reference data
Angst et al, 2001 [30]	211	65 (10.0) 37-86	Switzerland	Rheumatology and rehabilitation clinic	Patients with hip or knee OA referred for a comprehensive inpatient rehabilitation programme	Representative sample of French population[15,22]
Brazier et al, 1999 [33]	112	64	UK	Rheumatology outpatient clinic	All new patients with diagnosis of knee OA according to hospital rheumatologist or orthopaedic specialist	Representative sample of population aged 16 and over living in private households in the UK[14]
Ren et al, 1998 [31]	328	?*	US	Veterans Health Study, four Veterans Affairs outpatient clinics	Patients with OA, based on patient's report of having a physician's diagnosis, treatment, and/or symptoms	US general population norms[17]
Thumboo et al, 2002 [32]	110	61 33-86	Singapore	Tertiary hospital	Inpatients or outpatients with knee OA	Random sample, district of Singapore, including both public and private housing projects, age between 21 and 65[16]
Wolfe et al, 2000 [29]	648	68 (11.7)	US	Departments of rheumatology	Patients with OA of the hip or knee, first outpatient visit	Representative sample of US population[22]

SD: standard deviation, UK: United Kingdom, US: United States, OA: osteoarthritis
** ?: not presented in the article*

Table 3 –Studies in patients prior to total knee or total hip arthroplasty

Author, Year [Reference]	n	Age mean (SD) range	country	Setting	Case definition	Reference data
Arslanian et al, 1999 [50]	TKA 949 THA 570	TKA 69 36-93 THA 68 20-89	US	?*	Patients scheduled for TKA or THA	US general population norms[17]
Bachmeier et al, 2001 [36]	TKA 108 THA 86	TKA 72 (7.0) THA 65 (11.5)	Australia	Four hospitals in Sydney	Patients with OA of the hip or knee, admitted for TKA or THA	Australian population norms[19]
Bayley et al, 1995 [42]	TKA 117 THA 90	?	US	Orthopaedic surgery clinics	Patients scheduled for TKA or THA	US general population norms[17]
Benroth et al, 1999 [45]	TKA 110 THA 63	TKA 66 30-88 THA 66 30-88	US	?	Consecutive patients scheduled for TKA or TKA	US general population norms[17]
Brazier et al, 1999 [33]	TKA 118	TKA 71 47-87	UK	Rheumatology clinic	Patients with knee OA according to hospital rheumatologist or orthopaedic specialist, admitted for TKA	Representative sample of population aged 16 and over living in private households in the UK[14]
Croft et al, 2002 [57]	THA 611	THA median: 71	UK	Secondary care orthopaedic centre	Patients with hip OA on waiting list for THA	Representative sample of population aged 16 and over living in private households in the UK[14]
Dawson et al, 1996 [58]	THA 219	THA median: 71 (11) 36-90	UK	Preadmission assessment clinic, Nuffield Orthopaedic Centre, Oxford	Consecutive patients referred for THA	Representative sample of population aged 16 and over living in private households in the UK[14]

Table 3 continued–Studies in patients prior to total knee or total hip arthroplasty

Author, Year [Reference]	n	Age mean (SD) range	country	Setting	Case definition	Reference data
Dawson et al, 1996 [59]	THA 173	THA median: 71 38-89	UK	Preadmission assessment clinic	Patients with OA or RA scheduled for unilateral THA	Representative sample of adult population aged 16 and over living in private households in the UK[14]
Dervin et al, 2003 [47]	TKA 126	TKA 62 (8.6)	Canada	Orthopaedic outpatient clinic, Ottawa General Hospital	All patients with OA of the knee, referred for TKA	Canadian normative data[18]
Escobar et al, 2002 [28]	TKA 100 THA 103	TKA 71 (6) THA 69 (10.3)	Spain	Tertiary hospital	Patients with hip or knee OA on waiting list for TKA or THA	Randomly selected non-institutionalised female population 65 years and over in Spain[23]
Fortin et al, 1999 [48]	TKA 106 THA 116	TKA 67 THA 67	Canada	Brigham and Women's Hospital in Boston and Montreal General Hospital	All patients with hip or knee OA scheduled for elective primary TKA or THA	Canadian normative data[18]
Fortin et al, 2002 [49]	TKA 81 THA 84	TKA 68 (9.1) THA 66 (8.2)	Canada	Boston and Montreal teaching hospitals	Consecutive patients with OA scheduled for elective TKA or THA	Canadian normative data[18]
Hartley et al, 2002 [37]	TKA 100	TKA 76 47-90	UK	?	Consecutive patients scheduled for primary TKA	Representative sample of the UK population[22]
Hashimoto et al, 2003 [65]	TKA 428 TKA 261 TKA 170 TKA 113	71 (9) 69 (10) 69 (8) 68 (10)	UK US Australia Canada	International prospective cohort	Patients scheduled for primary total knee arthroplasty	Representative sample of the UK population[22], US[17], Australian[19] and Canadian[18] normative data
Heck et al, 1998 [38]	TKA 291	TKA 70 50-88	US	Orthopaedic surgery clinics, State of Indiana	Patients with knee OA in community practice, referred for TKA	US general population norms[17] and representative sample of US population[22]

Table 3 continued–Studies in patients prior to total knee or total hip arthroplasty

Author, Year [Reference]	n	Age mean (SD) range	country	Setting	Case definition	Reference data
Hozack et al, 1997 [39]	TKA 149 THA 151	TKA 70 40-100 THA 64 28-86	US	?	Patients undergoing surgery for degenerative arthritis of the knee or hip	US general population norms[17]
Jones et al, 2001 [40]	TKA 256 THA 197	TKA 71 THA 71	Canada	Community-based cohort, health care region	Patients recommended for primary TKA or THA	Canadian normative data[18]
Jones et al, 2000 [41]	TKA 276 THA 228	TKA 68 (10.1) THA 68 (10.1)	Canada	Community-based cohort, health care region	Patients recommended for primary TKA or THA, at least 7 days before surgery	Canadian normative data[18]
Kelly et al, 2001 [34]	313	68 27-89	Canada	Two referral hospitals, departments of orthopaedic surgery	Consecutive patients recommended for TKA or THA	Canadian normative data[18]
Kiebzak et al, 2002 [43]	TKA 415 THA 207	Patients of all ages were included	US	Orthopaedic clinic	Patients scheduled for elective primary TKA or THA	US general population norms[17]
Kiebzak et al, 1997 [44]	TKA 78 THA 80	TKA men 59 (15) women 68 (12) THA: men 66 (8) women 68 (10)	US	Miller Orthopaedic Clinic	Consecutive patients scheduled for TKA or THA	US general population norms[17]
Lingard et al, 2001 [25]	TKA 697	TKA 70 38-90	UK, US, Australia	Kinemax Outcomes Study; 12 centres in US, UK, and Australia	Patients with primary diagnosis of OA and no history of knee implant surgery, scheduled for TKA	Representative sample of population aged 16 and over living in private households in the UK[14]
Mahomed et al, 2002 [26]	TKA 89 THA 103	TKA 68 (9) THA 66 (9)	US, Canada	Two tertiary referral centres in Boston and Montreal	Patients undergoing primary TKA or THA	US general population norms[17] and representative sample of US population[22]

Table 3 continued–Studies in patients prior to total knee or total hip arthroplasty

Author, Year [Reference]	n	Age mean (SD) range	country	Setting	Case definition	Reference data
Mangione et al, 1997 [51]	THA 236	THA 67 (9)	US	University tertiary care hospital	Patients admitted for THA	US general population norms[17]
Nilsdotter et al, 2001 [52]	THA 160	THA 61 50-72	Sweden	Dept of orthopaedics, Halmstad	Patients with primary OA scheduled for THA	Normative data from seven general population studies in Sweden[20]
Nilsdotter et al, 2002 [53]	THA 124	THA 71 51-88	Sweden	Dept of Orthopaedics, Halmstad	Consecutive patients with primary OA scheduled for THA	Normative data from seven general population studies in Sweden[20]
O'Connell et al, 2000 [54]	THA 100	THA >50	Ireland	North Eastern Health Board Regional Orthopaedic Unit, Navan	Consecutive patients undergoing primary THA	Random sample from electoral register in Ireland[21]
O'Shea et al, 2002 [55]	THA 144	?	Ireland	Cappagh National Orthopaedic Hospital	Information from on-going in-hospital audit of THA	Random sample from electoral register in Ireland[21]
Salmon et al, 2001 [46]	TKA 53 THA 107	TKA 66 (11.1) THA 69 (11.0)	UK	Two teaching hospitals	Patients admitted for unilateral, primary elective TKA or THA	Representative sample of population aged 16 and over living in private households in the UK[14]
Singer et al, 1999 [56]	THA 284	THA 70 (10.3)	Canada	?	Patients with hip OA on waiting list for THA	Canadian normative data[18]
Williams et al, 1997 [35]	209	TKA 69 THA 62	Canada	Teaching or community hospitals in Ontario, departments of orthopaedic surgery	Patients referred for TKA or THA	Canadian normative data[18]

SD: standard deviation, UK: United Kingdom, US: United States, OA: osteoarthritis, TKA: total knee arthroplasty, THA: total hip arthroplasty
** ?: not presented in the article*

HRQL in patients with hip or knee disorders

In Table 4 (pooled) z-scores are presented to show the impact of hip and knee complaints on HRQL. Table 4 demonstrates, for example, that elderly patients with knee OA in the general population in the US[63] scored on average 0.3 standard deviations (SDs) below the reference population on the SF-36 general health subscale. Patients prior to THA (pooled estimate of 23 studies) scored on average 2.5 SDs below the reference population on the SF-36 physical functioning subscale, and 2.0 SDs below the reference population on the SF-36 role limitations in physical functioning subscale.

In studies using the PCS and MCS summary scores, patients scored approximately 1.5 to 2.5 SDs below the reference population for the SF-36 PCS subscale and up to 0.5 SD below the reference population for the SF-36 MCS subscale. Scores on the SF-36 PCS and MCS scales were about 1 SD lower in patients admitted for surgery than in community living elderly.

Two studies used the SF-12. Carmona et al[61] performed a study in the general population in Spain, and Hartley et al[37] assessed HRQL in patients scheduled for TKA in the UK. The results show poorer scores for patients in the Spanish general population, compared to patients scheduled for TKA in the UK.

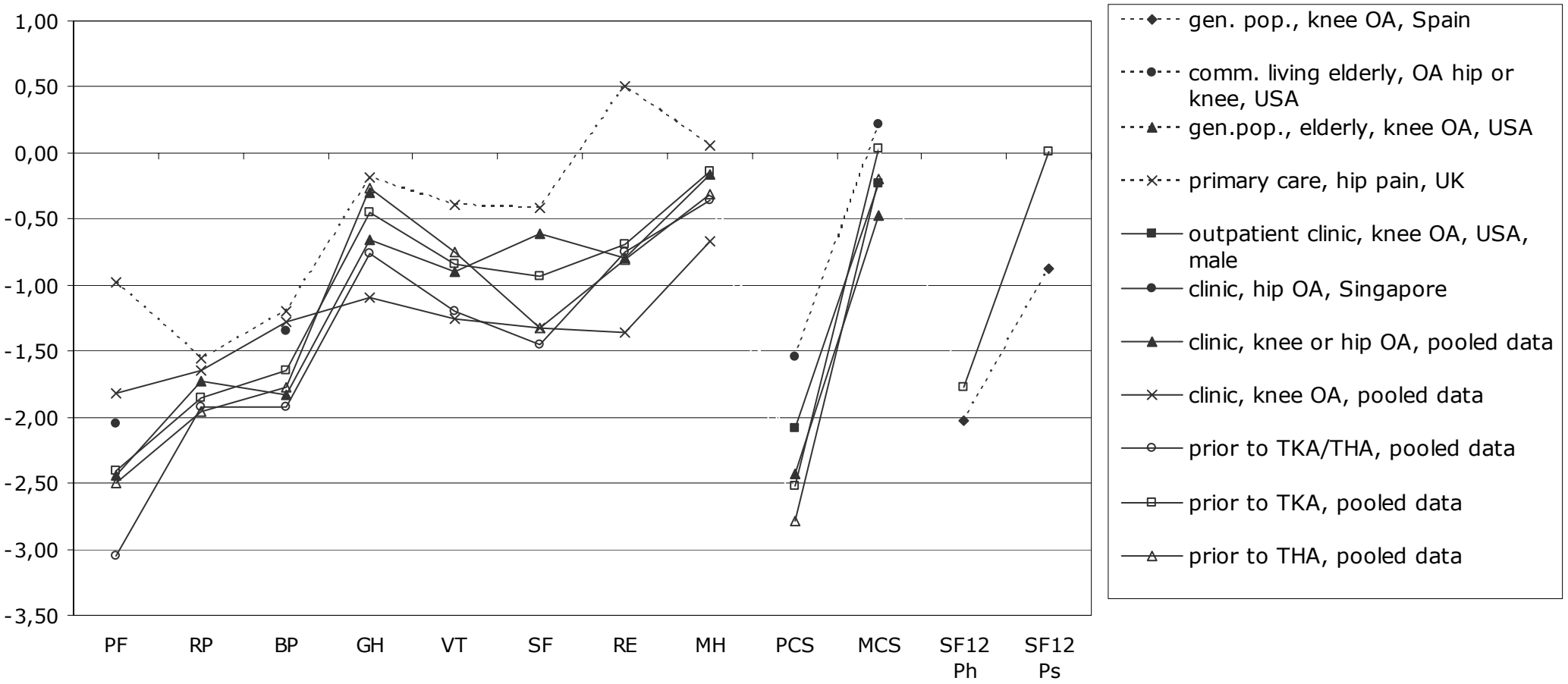
In Figure 2, the data from Table 4 are presented graphically. Figure 2 demonstrates that the profile for the different subscales shows a similar pattern of reduction in HRQL. Patients from all settings scored approximately 1 to 2 SDs below the reference population for three subscales of the SF-36: physical functioning, role limitations in physical functioning, and bodily pain. The scores on mental health in patients in the general population, primary care or among community-living elderly were rather similar to scores from reference populations. Scores on mental health were worse in patients in clinical settings. Clinical out-patients and patients admitted for surgery (TKA or THA) scored up to 1 SD below the reference population for mental health.

Table 4 – Impact on health-related quality of life: z-scores on dimensions of SF-36 and SF-12: pooled Z-scores are presented for subgroups of studies with similar patients in similar settings.

patient sample	study	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS	SF-12 Ph	SF-12 Ps
gen. pop., knee OA, Spain	Carmona et al, 2001 [61]											-2.0	-0.9
comm. living elderly, OA hip or knee, US	Cooper et al, 2001 [62]									-1.5	0.2		
gen.pop., elderly, knee OA, US	Wilcox et al, 2000 [63]				-0.3								
primary care, hip pain, UK	Birrell et al, 2000 [64]	-1.0	-1.6	-1.2	-0.2	-0.4	-0.4	0.5	0.1				
primary care, knee OA, US, male	Clark et al, 1998 [27]									-2.1	-0.2		
clinic, knee or hip OA	pooled z-scores[29,30] (Range)	-2.4	-1.7	-1.8	-0.7	-0.9	-0.6	-0.8	-0.2	-2.4 (-2.84 – -2.29	-0.5 (-0.62 – 0.0)		
clinic, knee OA	pooled z-scores[31-33] (Range)	-1.8 (-2.00 – -1.72)	-1.6 (-1.91 – -1.59)	-1.3 (-1.66 – -1.08)	-1.1	-1.3	-1.3	-1.4	-0.7				
prior to TKA/THA, Ca	pooled z-scores[34,35] (Range)	-3.1 (-3.18 – -2.87)	-1.9 (-2.08 – -1.70)	-1.9 (-2.01 – -1.80)	-0.8 (-0.97 – -0.45)	-1.2 (-1.29 – -1.07)	-1.5 (-1.58 – -1.26)	-0.7 (-1.14 – -0.16)	-0.4 (-0.56 – -0.06)				
prior to TKA	pooled z-scores[25,26,28,33,36-50,65] (Range)	-2.4 (-3.27 – -1.05)	-1.9 (-2.13 – -1.66)	-1.6 (-1.95 – -0.76)	-0.4 (-0.86 – 0.00)	-0.8 (-1.35 – -0.48)	-0.9 (-1.63 – -0.54)	-0.7 (-1.40 – -0.43)	-0.1 (-0.56 – -0.07)	-2.5 (-2.74 – -1.98)	0.0 (-0.19 – 0.61)	-1.8	0.0
prior to THA	pooled z-scores[26,28,36,39-46,48-59] (Range)	-2.5 (-3.35 – -1.23)	-2.0 (-2.36 – -1.70)	-1.8 (-2.16 – -0.88)	-0.3 (-0.90 – 0.58)	-0.8 (-1.49 – -0.13)	-1.3 (-1.93 – -0.59)	-0.8 (-1.77 – -0.19)	-0.3 (-0.75 – 0.32)	-2.8 (-2.94 – -2.43)	-0.2 (-0.41 – 0.61)		

PF: physical functioning, RP: role limitations in physical functioning, BP: bodily pain, GH: general health, VT: vitality, SF: social functioning, RE: role limitations in emotional functioning, MH: mental health, PCS: physical component score, MCS: mental component score, SF-12 Ph: SF-12 physical subscale, SF-12 Ps: SF-12 psychological subscale, OA: osteoarthritis, US: United States, UK: United Kingdom, Ca: Canada, TKA: total knee arthroplasty, THA: total hip arthroplasty
Data in brackets represent the range of the individual studies that were pooled. Empty cells: the article does not report that subscale.

Figure 2 - Z-scores for each subscale of the SF-36, the two summary scales of the SF-36, and the SF-12 subscales in different patient populations



PF: physical functioning, RP: role limitations in physical functioning, BP: bodily pain, GH: general health, VT: vitality, SF: social functioning, RE: role limitations in emotional functioning, MH: mental health, PCS: physical component score, MCS: mental component score, SF-12 Ph: SF-12 physical subscale, SF-12 Ps: SF-12 psychological subscale

Discussion

The results of this systematic review of 40 observational studies measuring HRQL in patients with non-traumatic hip or knee disorders show that these disorders have a substantial impact on HRQL. According to previous studies, the threshold for clinically important changes in health-related quality of life appears to be half a SD[60]. The scores on subscales with physical components were especially low: up to 2 SDs below reference values. Scores on subscales with mental and social components were only low for patients seen in clinical settings and those admitted for THA or TKA (up to 1 SD below reference values). These results indicate that patients from all settings were markedly impaired in their physical functioning, and that patients in clinical settings (who may have more severe hip or knee disorders) generally have a poor HRQL. Remarkably, the profile among the various subscales is about the same among all patient groups.

To put the results of our review into perspective, we compared the scores from the patient groups included in our review with those obtained from patients with other disorders, retrieved from the literature. This comparison shows that patients with hip or knee disorders have poorer scores on several dimensions of HRQL than patients with heart disease or cancer[66]. Patients with heart disease or cancer score up to 1.2 SD below reference values on physical subscales[67]. Although some of the HRQL effects seen in OA patients may have been caused by comorbidities, such as hypertension or cardiovascular disease[68], that affect persons with OA, this comparison suggests that hip or knee disorders can have a substantial effect on HRQL.

The results of this review show that patients with hip or knee disorders generally have high pain scores, which limits physical and social functioning. This draws attention to the importance of pain management and coping with pain in these patient groups. Interventions should be developed and evaluated that are directed towards reduction of pain, improvement of functional capacity, and HRQL of patients with hip or knee problems.

The population in western countries is aging, and an increasing number of people are suffering from hip or knee complaints. Most of these patients are encountered and cared for in primary care. However, only one study measured HRQL in patients with hip or knee disorders in a primary care setting. This study[64] concerned an older population, which may limit the possibilities for generalizing these results to other primary care populations. More research should be aimed at assessing and improving HRQL in patients with hip or knee problems in primary care.

Although the SF-36 is widely available and validated in many languages, for most reference populations, age and sex-specific data are not available, and for one study included in this review data from a country-specific reference

population were not available at all[30]. Furthermore, one study was performed in male patients and no sex-specific reference data were available[27]. Another study was performed in both male and female patients, but only sex-specific reference data were available[28]. These factors mean that our z-scores may have been somewhat biased because we could not use an appropriate reference population. Women generally score poorer on HRQL questionnaires than men. Thus, in studies for which we had to use female reference data, we may have slightly underestimated z-scores. In addition, the mean age of the reference population was in some studies lower than the mean age of the study population. This means that the burden of hip and knee disorders on the physical subscales may have been slightly overestimated. In the US reference population, the scores on the physical subscales for people aged 65-74 years were about 0.2-0.5 SD lower than the mean scores of the general population[17]. This may give an indication of the amount of overestimation in this study due to younger age of a reference population.

To our knowledge guidelines for pooling z-scores are not yet available. We decided to compute pooled z-scores weighted by study size. The inverse of the variance of an estimate is more often used as a weighting factor in meta-analysis. However, in our review the variance is part of the outcome of each study (the z-score). Using the inverse of the variance as a weighting factor would mean that studies that show a wide range in HRQL-scores (which may accurately reflect HRQL in the assessed population) would receive less weight in the pooled estimate. This would have affected the results of our review somewhat.

We only selected studies using the SF-36 or SF-12 for our review. Other generic and disease-specific measures are available and have been used in studies concerning patients with non-traumatic hip and knee complaints. For these measures often no information is available as to what scores represent important limitations in health, and data from reference populations are generally not available, which hampers the interpretation of absolute scores. More attention should be paid to the meaning of absolute scores of health status questionnaires, and age and sex-specific reference data of the general population should be provided.

The study in the general population in Spain is said to consist of patients with knee OA, obtained from a representative sample of the Spanish general population[61]. Unexpectedly, these results showed a lower z-score for these patients than for patients admitted for TKA, which raises doubt about the representativeness of these patients with knee OA.

In conclusion, this is the first review to quantify the impact of non-traumatic hip or knee disorders on HRQL. This impact turns out to be substantial, especially the impact on physical aspects of HRQL. The results of this review support the effort of the organizers of the Bone and Joint Decade[10]

to determine the burden of musculoskeletal diseases and underscore their statement that the HRQL of people with musculoskeletal conditions should be improved.

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Chapter 4
Determinants of the clinical course of musculoskeletal complaints in general practice: design of a cohort study

Johanna M van der Waal, Sandra DM Bot, Caroline B Terwee, Daniëlle AWM van der Windt, Lex M Bouter, Joost Dekker

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Abstract

Background

Musculoskeletal complaints are frequent and have large consequences for public health. Information about the prognosis after presentation in general practice is far from complete. Knowledge about determinants of the clinical course of musculoskeletal complaints is essential for management decisions and to inform patients about their prognosis. The purpose of this study is to provide information about the prognosis of musculoskeletal complaints other than low back pain by studying the course of these complaints in general practice and to identify determinants of this course.

Methods

Patients of 18 years and older, who present in general practice with a new episode of a musculoskeletal complaint of the neck, shoulder, elbow, wrist, hand, arm, hip, knee, ankle or foot, are recruited by their general practitioner (GP). Participants will receive complaint-specific questionnaires by mail at baseline and after 3, 6, 12 and 18 months. The following putative determinants of the course of the complaints will be investigated: sociodemographic characteristics, characteristics of the complaint, psychosocial job characteristics, physical workload, physical activity during leisure time, pain coping, mood, kinesiophobia, social support, optimism. The primary outcomes are perceived recovery, pain, functional status, sick leave and overall quality of life.

Background

Musculoskeletal complaints are a frequent health problem. The point prevalence among adults in the general population in the Netherlands is estimated at 45%[1]. In the Netherlands, every year 109 patients per 1000 persons visit their general practitioner (GP) with a new episode of musculoskeletal complaints[2]. Musculoskeletal complaints have great consequences for public health, because of their strong impact on functional disability, health care costs, sick leave and work disability. In the Netherlands, almost 26% of the functional disability in the population can be attributed to musculoskeletal disease[3]. About 6% of the total healthcare costs are spent on musculoskeletal problems[4]. In Sweden and Great Britain 30% of all sick-leave days and work disability are due to musculoskeletal problems[5;6].

In Dutch public health care, the GP serves as a filter, as all referrals to specialists, physiotherapists and most other health care providers need confirmation by a GP. This implies that the GP has to distinguish complaints with need of specialist care from those that can be managed in primary care. Such decisions require information about the risk of developing chronic pain and disability in relevant subgroups of patients. However, information about the determinants of the prognosis of musculoskeletal complaints, which is necessary to inform patients, and to decide on content of care and referrals, is far from complete.

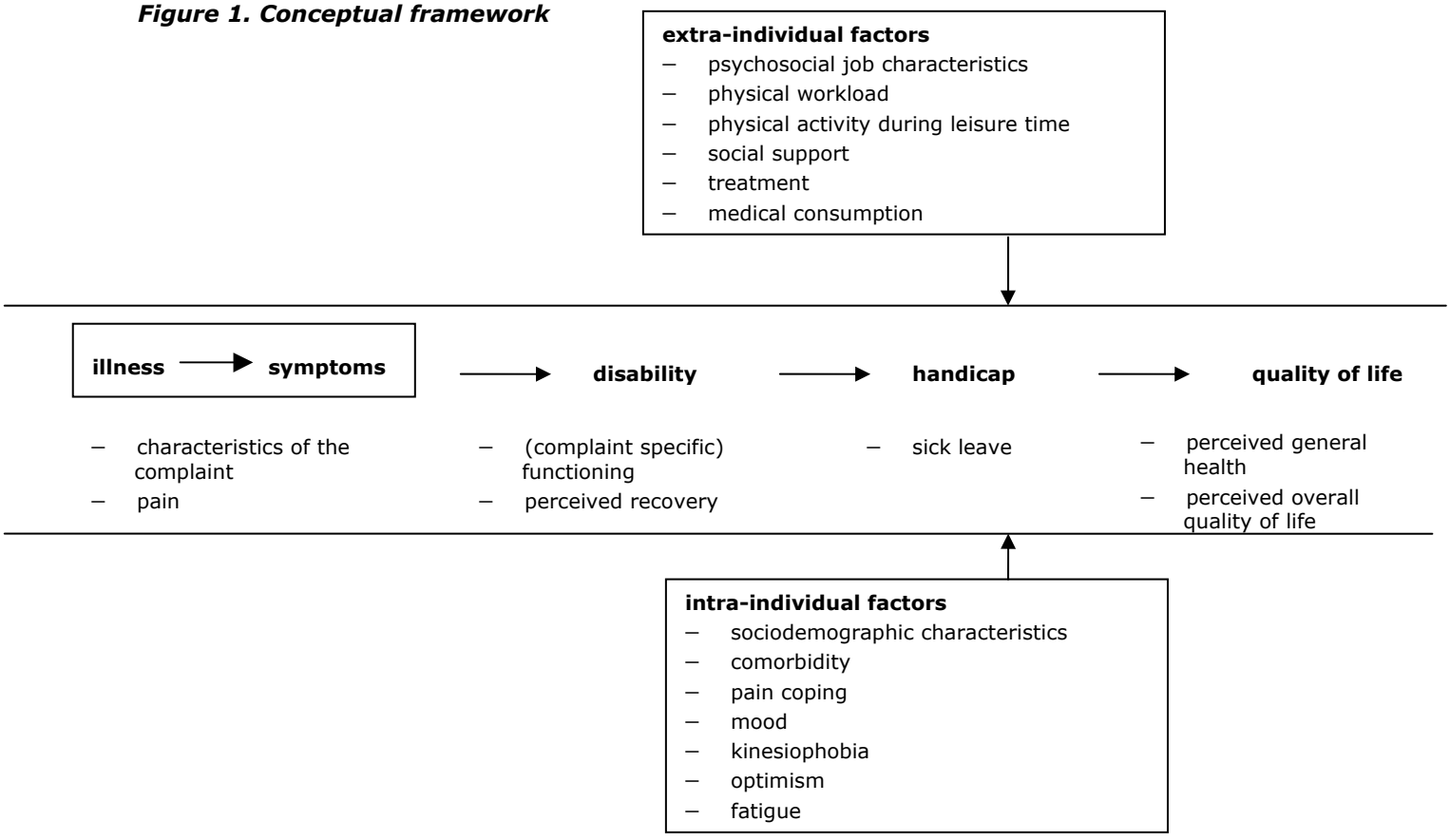
The course of low back pain has already received much attention, and has been studied thoroughly [7-11]. Therefore, low back pain has been excluded from this study. Little information is available about determinants that influence the course after presentation in primary care of almost all other musculoskeletal complaints. Studies on prognosis are mostly performed in specific populations; for example in a specific group of employees[12;13] or patients attending specialist care[13]. These results are not applicable in general practice[14].

From the limited amount of available evidence a few putative determinants of the course of musculoskeletal complaints can be derived, including severity and duration of the complaint, and some intra-individual factors and extra-individual (environmental) factors[13;15;16]. More severe pain and previous neck pain were associated with a worse prognosis of neck pain in the study of Borghouts et al.[13] Ariëns et al [17] reported a positive association between neck pain and the following work-related physical risk factors: neck flexion, arm force, arm posture, duration of sitting, twisting or bending of the trunk, hand-arm vibration and workplace design. Windt et al.[18] observed that a high risk of persistent or recurrent shoulder complaints was found for patients with concomitant neck pain and severe pain during the day. In the study of Jørgensen et al.[15] psychological distress acted as a determinant of physical

health change, sick leave and patient self-rated improvement in patients with musculoskeletal illness. Macfarlane et al.[19] reported disability as a determinant of continuing symptoms of shoulder pain. Avoiding physical activity had a negative effect on long-term functional status in early rheumatoid arthritis according to Evers et al.[20] and Lankveld et al.[21] Psychosocial variables, such as depressive symptoms or inadequate pain behavior, have not often been taken into account, although these factors have been shown to be related to a high risk of chronicity in low back pain[22]. So far, the majority of research has evaluated the prognostic value of clinical characteristics (symptoms and signs), whereas little attention has been given to the potential prognostic value of psychosocial and occupational factors.

We used the "disablement process" of Verbrugge[23] as a framework for studying determinants and outcomes in the present study (Figure 1). This conceptual model describes how chronic and acute conditions affect functioning in specific body systems, fundamental physical and mental actions, and activities of daily life. Furthermore, it describes the intra-individual and extra-individual factors that may influence functioning.

Figure 1. Conceptual framework



The purpose of this study is to provide knowledge about the course of musculoskeletal complaints other than low back pain in general practice and to identify determinants of this course.

Methods

Design

The study is designed as an observational prospective cohort study in general practice.
At baseline and after 3, 6, 12 and 18 months of follow-up, individual patient data are collected by means of self-administered questionnaires. The Medical Ethics Committee of the VU University Medical Center approved the study protocol.

Study population

Patients are eligible for participation in the study if they meet the following inclusion criteria: patients who visit their general practitioner with a new complaint or new episode of complaint of the neck, shoulder, elbow, wrist, hand, arm, hip, knee, ankle or foot; 18 years or above and capable of filling in Dutch questionnaires. An episode of complaint is considered 'new' if patients have not visited their GP for the same complaint during the preceding 3 months. Patients are excluded from the study if a fracture, malignancy, prosthesis, amputation or congenital defect causes the presented complaint and if patients are pregnant. Patients can be included in the study only once.

Inclusion procedure

The study is embedded in the 2nd Dutch National Survey of General Practice (NS2), carried out by the Netherlands Institute of Primary Health Care (NIVEL)[24]. A number of 200 GPs from 104 practices participate in the NS2. A total of 52 GPs (from 29 practices), who started first with the NS2, participate in our study. These GPs all use ICPC codes (International Classification of Primary Care) to classify the main complaint of each patient at each consultation[25]. A selection of ICPC codes was made to identify patients with musculoskeletal complaints (view Appendix). When the GP enters one of these ICPC codes into the computer during the consultation, a pop-up screen appears with a reminder of our study. The GP has a card available with the selection criteria in the office. Patients who are eligible for participation are informed about the study by their GP. If they show interest, they receive a brochure about the study. Subsequently, they fill in a preliminary consent form in which they allow their name and address to be released to the investigators, and indicate the location of their complaint on a manikin. In addition, patients are asked to select one of 3 categories that best represented their complaint:

neck/upper extremity, hip/knee or foot/ankle. Patients with generalized pain or pain in multiple locations are asked to indicate at which location the complaints are most severe or most troublesome, and were reason to consult their GP. Finally, this preliminary consent form is faxed to the investigators. When the pop-up screen appears, the GP indicates if the patient has been given a brochure, meets the selection criteria, and has given preliminary consent. With this information, we gain insight into the non-response and the external validity of our findings. Each GP includes patients during a period of 3 months.

If this procedure does not result in a sufficiently large number of participants (see below), the GPs will be asked to extend the inclusion period. Furthermore, additional GPs will be recruited outside the setting of NS2. These additional GPs will follow the same inclusion procedure, although the supporting NS2 software, which includes the pop-up reminder screen, is not available to these GPs.

Mailing procedure

After receiving a preliminary consent form, the investigators send additional information about the study and a final consent form to the patient. Also the baseline questionnaire is included in this package. Patients who are unwilling to participate are asked to return a non-response card. In order to increase the response rate, participants who have not returned the questionnaire within 10 days are contacted by telephone. Patients, who return an incomplete questionnaire, are contacted to complete the questionnaire by telephone interview. In addition, small incentives (coffee, tea and candies) are presented to the participants.

Questionnaires

Depending on the complaint marked on the fax, patients receive a complaint-specific questionnaire. Three different kinds of questionnaires have been developed: questionnaires for 1) complaints of the neck and upper extremities, 2) complaints of the hip or knee, 3) complaints of the ankle or foot.

Based on the model of Verbrugge and information derived from preceding studies, the influence of the following intra-individual determinants on the course of the complaints will be investigated: sociodemographic characteristics, characteristics of the complaint, comorbidity, pain coping, mood, kinesiophobia and optimism. The following extra-individual determinants will be investigated: psychosocial job characteristics, physical workload, physical activity during leisure time and social support. The content of the questionnaires is shown in Table 2.

Table 2 – Content of the questionnaires

outcome measure	assessment	measured in questionnaire				
		at baseline	**at 3 months**	**at 6 months**	**at 12 months**	**at 18 months**
– characteristics of the complaint	– questions about severity and duration of the complaint (Where and how long do you have complaints? What do you think is the cause of your complaints? Did you visit any kind of doctor, therapist, or social worker? Did you use any medication to relieve your complaint during the past 3 months? What did your GP do concerning your complaint? Have you had the complaint before during the past year? How often did your complaint bother you during the past 3 months? Do you have any other complaints?)	X	X	X	X	X
– pain	– 11-point numerical rating scale[26]	X	X	X	X	X
– perceived recovery	– 6-point rating scale (completely recovered, much improved, improved, no change, worse, much worse) [26]		X	X	X	X
– functioning	– scales from the SF-36[27]: physical and emotional role-functioning – all scales of SF-36	X	 X	X	X	X
– complaint specific functioning 1. upper extremities and neck 2. hip or knee – ankle or foot	– complaint specific questionnaires 1. based on the Pain Free Function questionnaire[28] and the Copenhagen Neck Functional Disability Scale[29] 2. Western Ontario and McMaster Universities OA index (WOMAC)[30;31] – Foot Function Index[32]	X	X	X	X	X
Sick leave	number of days of absence and reason of absence in past 3 months because of the complaint at issue	X	X	X	X	X
Perceived General Health	scale from the SF-36[27]: perceived general health	X	X	X	X	X
Perceived overall Quality of life	5-point rating scale	X	X	X	X	X
determinants: intra-individual						
Sociodemographic characteristics:	age, sex, pregnancy	X	X	X	X	X
	right-/left-handedness, ethnicity (Dutch, Surinamese, Antillean/Aruban, Turkish, Moroccan), marital status (unmarried/never been married, married/living together, widow, divorced), household composition (number of persons and number of children below 5 years of age), length, weight, smoking behavior (smoking every day, smoking now and then, not smoking but previously every day, not smoking but previously now and then, never smoked), educational level and work status (number of working hours (paid activities) per week; 6-point rating scale), profession/occupation (open question)	X				
Comorbidity	list of complaints and diseases[33]	X				
Pain coping	Pain Coping Inventory (PCI)[34]	X				
Mood	distress scale from the Four Dimensional Symptom Questionnaire (4DSQ) [35],	X	X	X	X	X
Kinesiophobia	derived from the Tampa Scale[36;37] and the Fear Avoidance and Beliefs Questionnaire (FABQ)[38]	X				
Optimism	Life Orientation Test (LOT)[39;40]			X		
Fatigue	SF-36 vitality scale	X				
determinants: extra-individual						
Psychosocial job characteristics	Job Content Questionnaire (JCQ)[41]	X				
Physical workload	based on the Dutch Musculoskeletal Questionnaire[42]	X				
Physical activity during leisure time	type of physical activity and how often	X	X	X	X	X
Social support	Social Support Scale (SOS)[43]	X				
Treatment	– actions/advice by the GP (wait and see, drug prescriptions, rest, referral to therapist or specialist, exercises, injection, hot or cold compresses) – actions by the patient (self-medication)	X	X	X	X	X

Outcome measures

The questionnaires will be sent at baseline (approximately 16 pages) and after 3, 6, 12 and 18 months (approximately 8 pages) and contain the following outcome measures: at the level of symptoms, pain is scored on an 11-point numerical rating scale. At the level of disability, functioning is measured with complaint specific questionnaires (Table 2) and subscales of the Medical Outcomes Study 36-item Short Form Health Survey (SF-36)[27]: physical role-functioning, emotional role-functioning, after 6, 12 and 18 months of follow-up and the complete SF-36 after 3 months of follow-up. Perceived recovery is scored by the patient on a 6-point rating scale. At the level of handicap, sick leave is measured. At the level of quality of life, perceived general health (subscale of the SF-36) is measured. Overall quality of life is measured on a 5-point rating scale, based on the format of the first question of the perceived general health subscale of the SF-36.

In contrast to hip or knee complaints (WOMAC) or foot problems (Foot Function Index), an upper extremity disability scale, suitable for our study, is not available in Dutch. We considered it important to assess and analyze upper extremity function as one unit (kinetic chain[44]). Therefore, we decided against using several joint-specific questionnaires, and derived a new scale from two existing, validated questionnaires[28] [29]. The face validity of our scale is satisfactory, and other clinimetric properties (internal consistency, validity and responsiveness) will be analyzed within the framework of our cohort study.

Sample size

There are no straightforward rules for computing sample size for observational studies. A guideline that is often being used advises at least 10 patients per determinant[45]. The expected proportion of patients in each category of complaint (according to localization of complaint) is based on the incidence of these complaints in Dutch general practice[2]. Based on these data we expect that patients with hip complaints will comprise the smallest category (5,1%). Participation of 2000 consecutive consulting patients should be sufficient to include 100 patients with hip complaints, which enables the construction of a predictive model for hip complaints that includes 10 predictors.

Statistical analyses

The analysis will initially be conducted separately for different categories of complaints. Three categories of complaints will be made according to localization of the complaint as indicated by the patient questionnaire; 1) complaints of the neck and upper extremities, 2) complaints of the hip or knee, 3) complaints of the ankle or foot. In each category, traumatic (according to ICPC code or cause of the complaint, indicated by the patient as 'accident') vs. non-traumatic, chronic (i.e. symptom duration at least 3 months) versus acute

and elderly (65+ years) vs. non-elderly, will be compared. The course of the complaints will be described by means of descriptive statistics. Determinants that influence the course will be determined by means of (logistic) regression analysis and analysis for repeated measurements over time (Generalized Estimating Equations).

Outcome measures will be analyzed separately in different multiple regression analyses. Correlations between potential determinants will be calculated with Pearson or Spearman correlation coefficients. In the case of high correlation between 2 determinants only the most predictive determinant in the univariate analyses will be included in the multiple regression models.

The NS2 will provide additional information about all patients who are eligible for the study. This information covers ICPC code, medical consumption and co-morbidity during the 12 months in which the GP participates in the NS2. The information is available for participants of the study as well as for eligible patients who refused to participate. This information will be used to analyze if the group of participants is a good representation of the source population of eligible patients. Furthermore, the information will be used to calculate yearly incidences of all categories of complaints in general practice.

Conclusions

This protocol describes an observational prospective cohort study on the determinants of the course of musculoskeletal complaints in general practice. The results will give GPs indications for optimal treatment and referral. Based on the results of this study, priority can be given to the development and evaluation of intervention strategies in general practice, including medical interventions, ergonomic advice or cognitive-behavioral interventions. Furthermore, the study can contribute to existing Dutch clinical guidelines for General Practice. The intended size of the study population is sufficiently large and the follow-up period is long enough to describe the influence of at least 10 determinants per diagnostic group on the course of complaints over 3 to 18 months. The results of this study will be presented as soon as they are available.

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Appendix

International Classification of Primary Care (ICPC) codes, selected for inclusion

L01	Neck Symptoms/Complaints
L08	Shoulder Symptoms/Complaints
L09	Arm Symptoms/Complaints
L10	Elbow Symptoms/Complaints
L11	Wrist Symptoms/Complaints
L12	Hand/Finger Symptoms/Complaints
L13	Hip Symptoms/Complaints
L14	Leg/Thigh Symptoms/Complaints
L15	Knee Symptoms/Complaints
L16	Ankle Symptoms/Complaints
L17	Foot/Toe Symptoms/Complaints
L18	Muscle Pain/Fibrositis
L19	Other Symptoms, Multiple/Unspecified Muscle
L20	Symptoms Multiple/Unspecified Joints
L28	Disability/Impairment
L29	Other & Multiple Musculoskeletal Symptoms
L77	Sprain Of Ankle/Foot
L78	Sprains/Strains of Knees
L79	Sprains/Strains Other Joints
L80	Dislocations
L81	Other Injury Musculoskeletal
L83	Syndrome Of Cervical Spine
L84	Osteoarthritis Spine
L85	Acquired Deformities Of Spine
L87	Ganglion Joint/Tendon
L88	Rheumatoid Arthritis
L89	Osteoarthritis Hip
L90	Osteoarthritis Knee
L91	Other Osteoarthritis
L92	Shoulder Syndrome
L93	Tennis Elbow
L94	Osgood-Schlatter, Osteochondritis
L95	Osteoporosis
L96	Acute Meniscus/Ligament Knee
L97	Chronic Internal Knee Derangement
L98	Acquired Deformities Limbs
L99	Other Musculoskeletal/Connective Disorder
N93	Carpal Tunnel Syndrome

Chapter 5
Health-related and overall quality of life of patients with chronic hip and knee complaints in general practice

Johanna M. van der Waal, Caroline B. Terwee, Daniëlle A.W.M. van der Windt, Lex M. Bouter, Joost Dekker

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Abstract

Background. Information about quality of life of patients with chronic hip or knee complaints in general practice is scarce. This study describes the health-related and overall quality of life (HRQL) of these complaints.
Methods. Data were obtained from a cohort study in general practice. HRQL at three months follow-up was analysed. HRQL was measured as: symptoms, physical, psychological and social functioning, and general health perceptions, using the Western Ontario and McMaster Universities osteoarthritis index (WOMAC) and the MOS 36-Item Short-Form-Health Survey (SF-36). Overall quality of life was measured using a 5-point rating scale.
Results. The results show that patients with chronic hip or knee complaints have a substantial lower health-related and overall quality of life compared to patients who had recovered from baseline hip or knee complaints. The largest effect was found on symptoms and physical functioning: up to 2.9 standard deviations below patients who had recovered from baseline hip or knee complaints. Scores of patients with both chronic hip and knee complaints were significantly worse than scores of patients with only knee complaints on most subscales.
Conclusion. In patients with chronic hip or knee complaints the worst scores were seen on scales that measure symptoms and physical functioning, but still a substantially lower score was obtained for overall quality of life. Quality of life was poorer for patients with both chronic hip and knee complaints compared to those with chronic hip or knee complaints only.

Introduction

Many people suffer from hip or knee complaints. The 12-months prevalence among adults in the general population in the Netherlands is estimated at 28%[1]. The prevalence increases with age[1]. In the Netherlands, every year 9.6 patients per 1000 persons visit their general practitioner (GP) with a new episode of hip complaints and 31 patients per 1000 persons with a new episode of knee complaints[2]. Although these complaints are often self-limiting and of relatively short duration, many of these patients develop chronic pain.

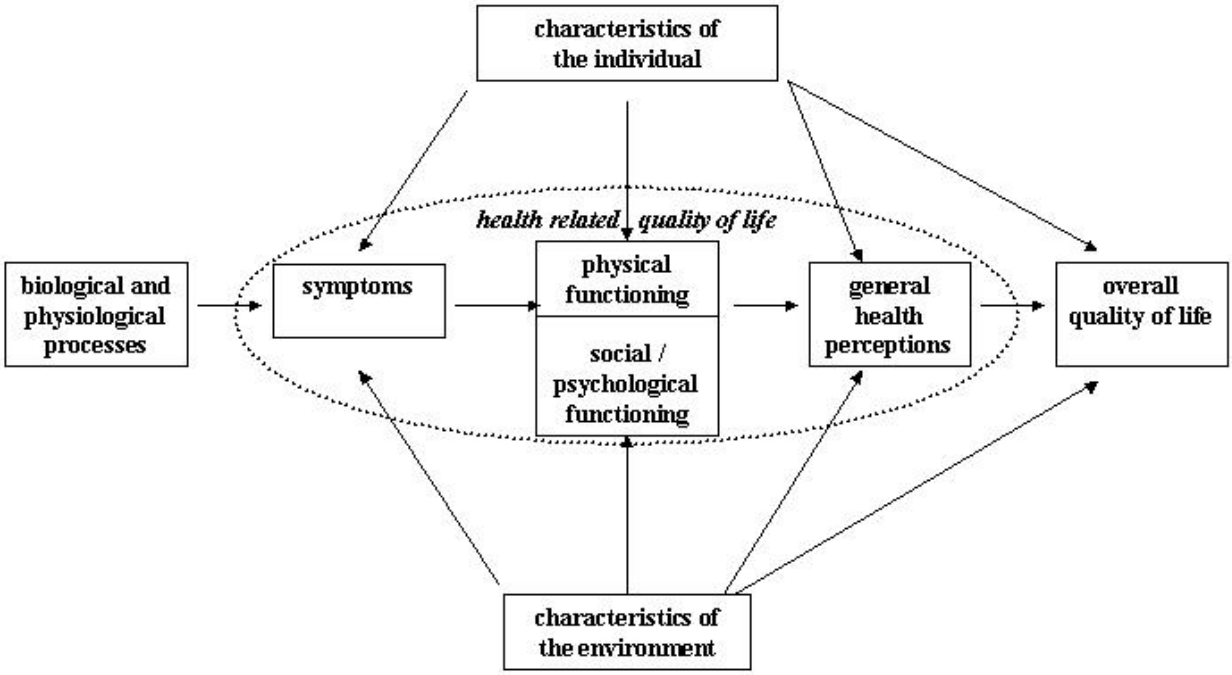
Musculoskeletal disorders such as chronic hip and knee complaints have a large impact on functional disability, health care costs, sick leave and work disability[3] and have, therefore, substantial economical consequences [4-6]. The United Nations, the World Health Organization (WHO), governments, professional and patients' organisations have therefore declared 2000-2010 the Bone and Joint Decade, with the aim of determining the burden of musculoskeletal diseases and improving the health related quality of life of people with musculoskeletal conditions[7-9]. Quantifying the health burden of (musculoskeletal) disorders is critical to decisions involving the allocation of limited health care resources.

The burden of hip and knee complaints relates not only to its incidence and prevalence, but also to its impact on the health-related quality of life (HRQL) of the patients who suffer from it[8]. Although HRQL in patients with osteoarthritis of the hip or knee treated in secondary or tertiary care has been studied extensively, data about the HRQL of patients with chronic hip or knee complaints in general practice are still scarce. We recently performed a systematic review, describing the impact of hip and knee complaints on HRQL as measured by the MOS 36-Item Short Form Health Survey (SF-36). Most studies concerned patients in clinical studies, and include referred patients with more serious complaints. Only one study in general practice was found[10]. This study[10] describes the HRQL of new attenders with hip pain. Data about the HRQL of patients with chronic hip and knee complaints in general practice is lacking.

The purpose of this paper is, therefore, to determine the HRQL of patients with chronic hip or knee complaints presented in general practice. A model was used as a framework for studying HRQL (Figure 1). This model was based on the "disablement process" described by Verbrugge and Jette[11] and on a HRQL model of patient outcomes, introduced by Wilson and Cleary[12]. In this model the term HRQL is used as a summary term for three outcome levels: symptoms, (physical, psychological and social) functioning and general health perceptions. Clinical (biological or physiological) processes are on the left side of the model. These clinical processes are experienced by the patient as symptoms such as pain or stiffness. These symptoms can lead to functional

limitations in daily activities, such as walking, working, or visiting friends, which influences the general health perceptions and overall quality of life.

Figure 1. Relationships among measures of patient outcome in a health-related quality of life model. Adapted from Verbrugge and Jette[11] and Wilson and Cleary[13]



The objective of the present study was to assess the HRQL of patients with chronic hip or knee complaints as measured at three different levels of outcome: symptoms (pain and stiffness), physical, psychological, and social functioning and general health perceptions. In addition, overall quality of life was assessed.

Methods

Design

Data were obtained from a cohort study in 61 general practices (97 general practitioners) on determinants of the clinical course of musculoskeletal complaints. The general practitioners (GPs) who participated in this study form a random sample of all Dutch GPs. Part of these GPs participated in the Second Dutch National Survey of General Practice (NS2)[14]. The GPs all used ICPC codes (International Classification of Primary Care) to classify the main complaint of each patient at each consultation[15]. A selection of ICPC codes was made to identify patients with musculoskeletal complaints (Table 1). Patients were eligible for participation in the study if they met the following inclusion criteria: patients who visited their general practitioner with a new complaint or new episode of a complaint of the hip or knee (according to selected ICPC codes); were 18 years or older and were capable of filling in Dutch questionnaires. An episode of complaint was considered 'new' if patients had not visited their GP for the same complaint during the preceding 3 months. Patients were excluded from the study if a fracture, malignancy, prosthesis, amputation or congenital defect caused the complaint at issue or if a patient was pregnant.

Table 1 – International Classification of Primary Care (ICPC) codes, selected for inclusion

L01	Neck Symptoms/Complaints
L08	Shoulder Symptoms/Complaints
L09	Arm Symptoms/Complaints
L10	Elbow Symptoms/Complaints
L11	Wrist Symptoms/Complaints
L12	Hand/Finger Symptoms/Complaints
L13	Hip Symptoms/Complaints
L14	Leg/Thigh Symptoms/Complaints
L15	Knee Symptoms/Complaints
L16	Ankle Symptoms/Complaints
L17	Foot/Toe Symptoms/Complaints
L18	Muscle Pain/Fibrositis
L19	Other Symptoms, Multiple/Unspecified
L20	Symptoms Multiple/Unspecified Joints
L28	Disability/Impairment
L29	Other & Multiple Musculoskeletal
L77	Sprain Of Ankle/Foot
L78	Sprains/Strains of Knees
L79	Sprains/Strains Other Joints
L80	Dislocations
L81	Other Injury Musculoskeletal
L83	Syndrome Of Cervical Spine
L84	Osteoarthritis Spine
L85	Acquired Deformities Of Spine
L87	Ganglion Joint/Tendon
L88	Rheumatoid Arthritis
L89	Osteoarthritis Hip
L90	Osteoarthritis Knee
L91	Other Osteoarthritis
L92	Shoulder Syndrome
L93	Tennis Elbow
L94	Osgood-Schlatter, Osteochondritis
L95	Osteoporosis
L96	Acute Meniscus/Ligament Knee
L97	Chronic Internal Knee Derangement
L98	Acquired Deformities Limbs
L99	Other Musculoskeletal/Connective
N93	Carpal Tunnel Syndrome

Patients who were eligible for participation, were informed about the study by their GP and their names and addresses were send to the EMGO Institute. At baseline and after 3, 6, 12 and 18 months of follow-up, individual patient data were collected by means of self-administered questionnaires. Depending on the location of the complaint, patients received a complaint-specific questionnaire for 1) complaints of the neck and upper extremities, 2) complaints of the hip or knee or 3) complaints of the ankle or foot. For this article, patients who filled in the questionnaire about complaints of the hip or knee were used to study HRQL at three months follow-up. Further details about the design of the study are described elsewhere[16].

Complaints were considered chronic if patients indicated that they still had hip or knee complaints after three months follow-up. The question asked in the questionnaire was: "Is the complaint for which you consulted your GP, still troubling you?". Data from patients with hip or knee complaints at baseline, but who had recovered after three months were used as reference data.

The Medical Ethics Committee of the VU University Medical Center approved the study protocol.

HRQL assessment

Three questionnaires were used. First, the Western Ontario and McMaster Universities (WOMAC) osteoarthritis index[17] was used as a disease-specific HRQL questionnaire. The WOMAC contains three subscales: pain, stiffness and physical functioning with 5, 2, and 17 questions, respectively. The 5-point Likert version of the WOMAC was used. Item responses range from "none" to "extreme" complaints. The WOMAC is well tested, and its reliability, validity, and responsiveness are considered to be satisfactory[18;19]. The version of the WOMAC used in this study asks respondents to think about their "hip or knee complaints" instead of their "arthritis". The scores of the three subscales were standardised to a range of values from 0 to 100: 100 representing the best health status and 0 the worst possible health status. Second, the SF-36 [20] was used as a generic HRQL questionnaire. The questionnaire is a 36-item generic HRQL measure designed to assess eight health concepts relevant to a person's functional status and well being. The eight scales measured by the SF-36 are physical functioning, role limitations in physical functioning, role limitations in emotional functioning, social functioning, bodily pain, mental health, vitality and general health. Scale scores range from 0 to 100 with higher scores representing better perceived health. The SF-36 is a well-validated, reliable measure of HRQL and has been used in patients with many different chronic conditions[21]. Third, perceived overall quality of life was measured with a single question, asking: "How would you rate your quality of life in general?". It was scored on a 5-point rating scale, based on the format of the first question of

the general health perceptions subscale of the SF-36. Higher scores represent better perceived quality of life.

The various subscales of the above-mentioned questionnaires correspond to the different outcome levels in our model (Figure 1). The symptoms pain and stiffness were measured. Pain was measured using the pain scale of the WOMAC and the subscale bodily pain of the SF-36. Stiffness was measured using the stiffness subscale of the WOMAC. Various aspects of physical functioning were measured using the physical functioning scale of the WOMAC and two subscales of the SF-36 (physical functioning and role limitations in physical functioning). Psychological and social functioning were measured using three subscales of the SF-36: mental health, social functioning and role limitations in emotional functioning. General health perceptions were measured using two subscales of the SF-36: vitality and general health. Perceived overall quality of life was measured with the single overall quality of life-item.

Statistical analyses

Scores on the WOMAC, SF-36 and quality of life item were computed and presented separately for three different patient groups: patients with chronic knee complaints, patients with chronic hip complaints and patients with chronic hip and knee complaints. This subdivision of patients was based on the complaints that patients indicated in the 3-months follow-up questionnaire. If a patient indicated that he/she had both hip or knee complaints he/she was included in the group "both". At least one of these complaints already existed at baseline. To put the scores of patients with chronic complaints into perspective, data from two references populations were used. For the SF-36, data from a representative sample of the Dutch general population was used[22]. For the WOMAC, no reference data from a general population are available, because the WOMAC is usually only completed by patients with hip or knee complaints. However, in our cohort study, patients were asked to complete all questionnaires during follow-up, even when they had recovered from their complaints. We used the group of patients who had recovered from their baseline hip or knee complaints after 3 months follow-up as a proxy for a reference group from the Dutch general population. Analysis of variance (ANOVA) with post hoc Bonferroni analysis was performed to compare mean scores on HRQL measures between the three patient groups and the reference group of patients who had recovered. Age and gender were used as covariates since in general women and people with higher age score lower on HRQL scales.

Subsequently, z-scores (effect sizes) were calculated for each HRQL measure by dividing the difference between the mean score of the patient group and the mean score of a reference population by the standard deviation of the mean score of the reference population. For all subscales, data from the

patient group who had recovered from their baseline hip or knee complaints were used as reference data. Results were presented separately for the three different patient groups with chronic complaints. Computing z-scores enables a direct comparison between the different HRQL measures. The guidelines of Cohen for the interpretation of effect sizes were used[23]. Using these guidelines, a z-score of 0.2 is considered a small difference, a z-score of 0.5 a moderate difference, and a z-score of 0.8 a large difference. According to previous studies, the threshold for clinically important differences in health-related quality of life appears to be half a standard deviation (SD)[24]. Therefore, a z-score of 0.5 or larger was considered a clinically important difference.

Results

A total of 257 patients with hip or knee complaints out of the 333 (77%) who completed the baseline questionnaire, also completed the three months follow-up questionnaire. The characteristics of these patients are shown in Table 2. Of these 257 patients, 160 (63%) still had complaints after 3 months and were considered as having chronic complaints.

Table 2 – Characteristics of the study population

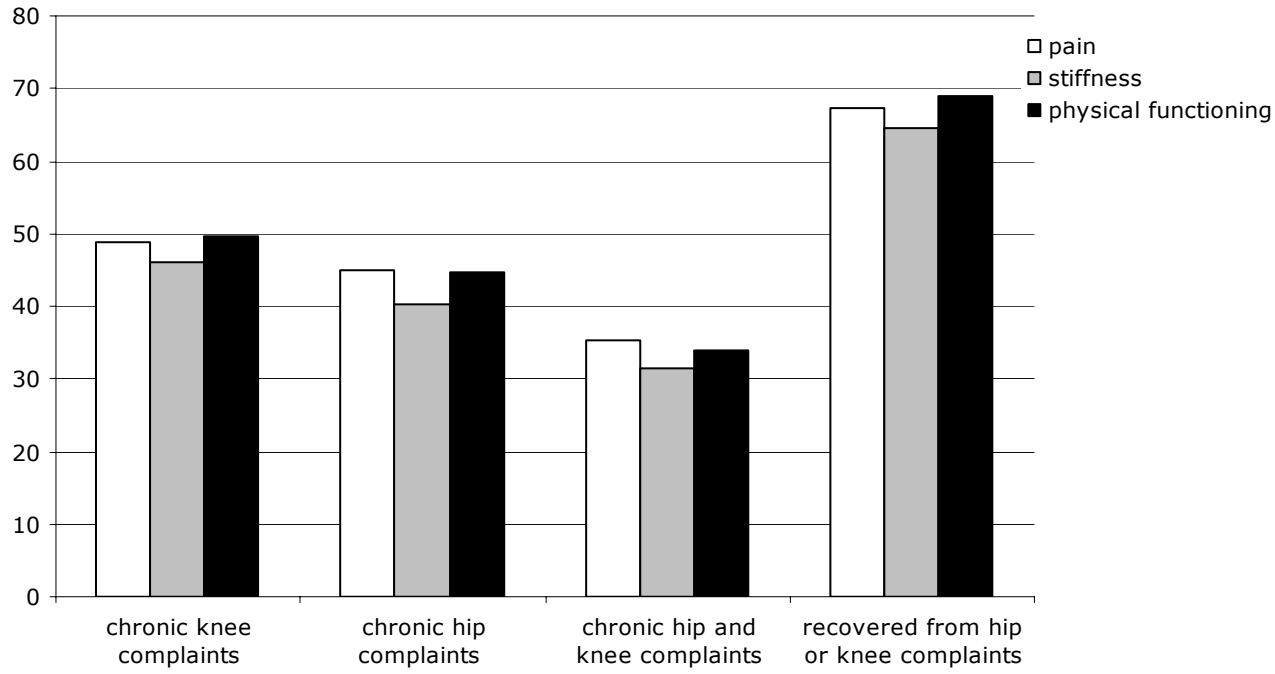
	chronic hip complaints	chronic knee complaints	chronic hip and knee complaints	recovered from hip or knee complaints
number	33	102	25	97
sex – % women	70%	54%	64%	46%
age in years – mean (SD)	47 (15.4)	48 (15.5)	57 (14.2)	46 (15.4)
paid activities, working	55%	64%	24%	69%
no paid activities	45%	36%	76%	30%
other musculoskeletal complaints				
upper extremities	42%	17%	56%	26%
foot or ankle	3%	7%	16%	7%
back pain	27%	21%	36%	20%
no other musculoskeletal complaints	39%	61%	20%	62%

Most of the patients who had chronic complaints, suffered from knee complaints only (64%); 33 patients (21%) experienced only hip complaints, while 25 patients (15%) suffered from both hip and knee complaints. As shown in Table 2, patients with hip and knee complaints were on average older ($p<0.05$) than patients who had recovered from baseline hip or knee complaints. Furthermore, patients with both hip and knee complaints more frequently reported other coexisting musculoskeletal complaints ($p<0.05$).

Figure 2 shows the mean WOMAC scores for the four patient groups. Patients with only hip complaints scored similar to patients with only knee complaints. Patients with both hip and knee complaints scored worst on all subscales of the WOMAC. On average, they scored 9-11 points below the

scores of patients with hip complaints only (not statistically significant) and 13-16 points below patients with knee complaints only ($p<0.05$). All differences were adjusted for differences in age and gender. All patient groups differed significantly from the reference group ($p<0.05$).

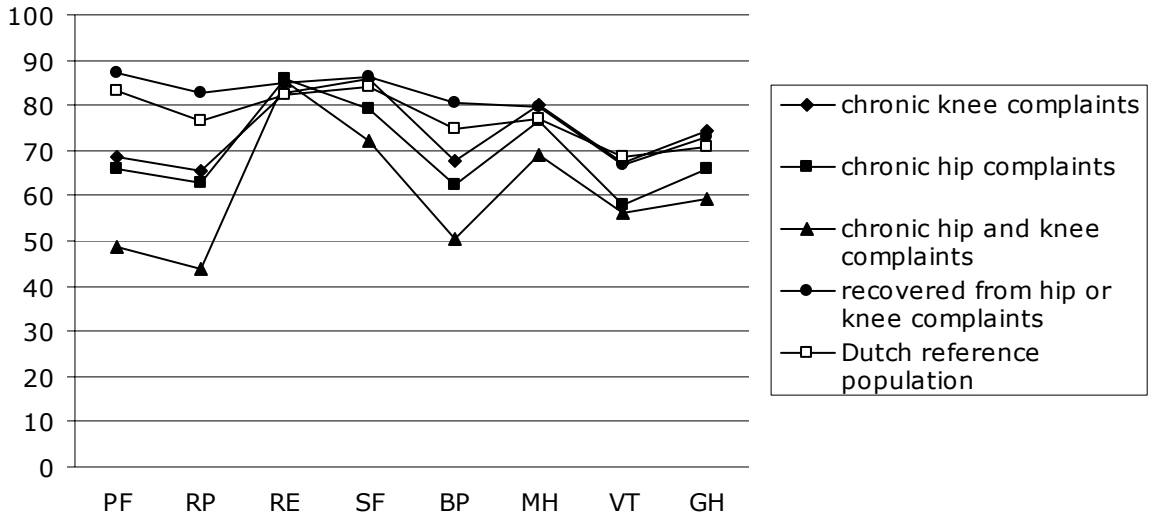
Figure 2 – Mean WOMAC scores* in patients with hip or knee complaints in general practice



**scores are standardised to a range of values from 0 to 100 and adjusted for differences in age and gender*

Figure 3 shows the SF-36 scores according to the type of complaint. Again, patients with both hip and knee complaints scored worst on all subscales, especially on the subscales physical functioning, role limitations in physical functioning and bodily pain. On these subscales all patient groups scored significantly lower than the reference group of patients who had recovered from baseline hip or knee complaints ($p<0.05$). Patients with both hip and knee complaints also had significantly lower scores on the mental health, general health, vitality and social functioning subscales than the patients who had recovered from baseline hip or knee complaints ($p<0.05$). The scores of the patients who had no complaints anymore, were similar to the scores of the Dutch reference population[22]. The scores of patients with either hip or knee complaints were rather similar. All analyses were adjusted for differences in age and gender.

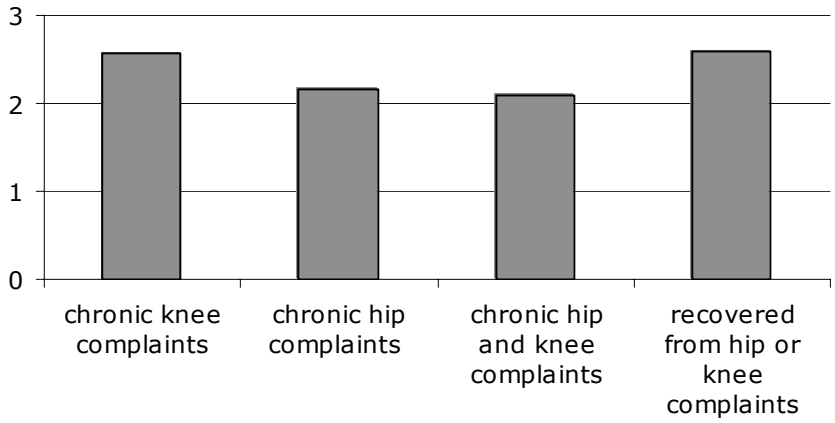
Figure 3 – Mean SF-36 scores* in patients with hip or knee complaints in general practice



PF: physical functioning, RP: role limitations in physical functioning, RE: role limitations in emotional functioning, SF: social functioning, BP: bodily pain, MH: mental health, VT: vitality, GH: general health
**scores are standardised to a range of values from 0 to 100 and adjusted for differences in age and gender*

The overall quality of life scores are presented in Figure 4. Again, patients with both hip and knee complaints scored worst: a mean score of 2.1 (SD=0.8); significantly lower than the reference group ($p<0.05$). Patients with knee complaints have a significantly higher mean score than patients with hip complaints (2.6 (SD=0.9) versus 2.2 (SD=0.8), $p<0.05$) and have the same scores as patients who did not have complaints anymore. The scores of patients with chronic hip complaints were significantly lower than the reference group ($p<0.05$). All differences were adjusted for differences in age and gender.

Figure 4 – Mean overall quality of life scores* in patients with hip or knee complaints in general practice



**scores range from 0 to 5 and adjusted for differences in age and gender*

Table 3 summarises the calculated z-scores. All three patient groups scored worst on the WOMAC subscale physical functioning (1.6-2.9 SD below the reference group), followed by the WOMAC pain subscale (1.3-2.3 SD below the reference group). The differences between the three patient groups and the reference group were moderate (>0.5 SD) to large (>1.0 SD) for all measures of symptoms and physical functioning. Scores related to psychological functioning, social functioning and general health perceptions were more than 0.5 SD below the reference group for patients with both hip and knee complaints only. Overall quality of life was more than 0.5 SD below the reference group for patients with hip complaints and patients with both hip and knee complaints. In general patients with both hip and knee complaints had the lowest scores for HRQL.

Table 3 – Measures of quality of life in patients with hip or knee complaints in general practice: z-scores

		chronic knee complaints	chronic hip complaints	chronic hip and knee complaints
symptoms	WOMAC pain	**-1.32**	**-1.59**	**-2.27**
	SF-36 BP	**-0.63**	**-0.91**	**-1.50**
	WOMAC stiffness	**-1.06**	**-1.41**	**-1.90**
physical functioning	WOMAC physical functioning	**-1.59**	**-1.99**	**-2.86**
	SF-36 PF	**-1.10**	**-1.26**	**-2.27**
	SF-36 RP	**-0.55**	**-0.63**	**-1.23**
social / psychological functioning	SF-36 SF	-0.03	-0.36	**-0.74**
	SF-36 MH	0.04	-0.21	**-0.69**
	SF-36 RE	-0.07	0.03	0.01
general health perceptions	SF-36 VT	0.04	-0.49	**-0.62**
	SF-36 GH	0.09	-0.40	**-0.78**
overall quality of life	Quality of life-scale	-0.03	**-0.58**	**-0.67**

Bold: z-score below –0.50 (compared to patients who had recovered from baseline hip or knee complaints)
PF: physical functioning, RP: role limitations in physical functioning, BP: bodily pain, GH: general health, VT: vitality, SF: social functioning, RE: role limitations in emotional functioning, MH: mental health

Discussion

The results of this observational study in general practice on patients with chronic hip or knee complaints show that patients with these disorders have a substantially lower HRQL and overall quality of life. The worst scores were seen on scales that measure symptoms and physical functioning: all patient groups (i.e. patients with hip and knee complaints; patients with knee complaints only; patients with hip complaints only) scored more than half a SD (0.6-2.9 SD) below patients who had recovered from baseline hip or knee complaints. This concerned all WOMAC subscales. General health perception scores were more than 0.5 SD below the reference group only for patients with both hip and knee complaints. Overall quality of life scores were more than 0.5 SD below the reference group for patients with only hip complaints and patients with both hip and knee complaints. These results indicate a considerable effect of chronic hip or knee complaints on all aspects of HRQL, especially on symptoms and physical functioning, and on quality of life.

In general, patients with knee complaints had a better HRQL than patients with hip complaints, although these differences were small (0.3-0.4 SD). Patients with both hip and knee complaints showed the worst HRQL, up to 2.9 SD below the reference group. Relatively poor scores on all HRQL measures were seen for patients with both hip and knee complaints. This effect is still present after the differences have been corrected for differences in age and gender. The patients with both hip and knee complaints also reported

more coexisting musculoskeletal complaints at other locations, as can be seen in Table 2, which can also partly explain the lower scores.

The scores on the different subscales of the SF-36 of patients who had recovered from baseline hip or knee complaints resembled the scores of the Dutch reference population. This supports the decision to use this group as a proxy for a reference group from the Dutch general population.

The incidence of hip and knee complaints in general practice was estimated to be 30 per 1000 person years (based on unpublished data from the NS2[14]). In the present study we expect that not all eligible patients were enrolled by the GP. Exact data about the number of eligible patients who were invited to participate, and the number refusing participation were not available to us. Nonetheless, we have no indication that selection bias has strongly influenced our findings. Regular contact was maintained with the GPs during recruitment. GPs indicated that the most important reasons for not including patients concerned the exclusion criteria, and lack of time or motivation to ask all patients during office hours.

The results of the present study clearly demonstrate the different levels of outcome in the model used in this study (Figure 1). Moving from left to right in the model means moving from the cell to the individual as a member of society. The concepts at each level from left to right are increasingly influenced by individual and environmental characteristics. We found that the worst scores in patients chronic hip and knee complaints can be seen on the level of functioning, followed closely by the level of symptoms and increases when moving to the right side of the model. However, patients with both hip and knee complaints and patients with hip complaints only also had substantially low scores at the level of general health perceptions and overall quality of life.

In this study chronic hip or knee complaints were defined on the basis of prospective data. At baseline and after 3 months follow-up patients were asked about their complaints. Haggerty et al[25] showed that a single assessment underestimates the occurrence of chronic complaints. Asking patients about their complaints twice, can give a more reliable estimate of the duration of their complaints.

The population in western countries is ageing, and an increasing number of people are suffering from hip or knee complaints. Most of these patients are encountered and cared for in primary care. However, in a recently conducted systematic review, we only found one study measuring HRQL in patients with hip or knee disorders in a primary care setting. This study[10] concerned an older population (mean age=63), which may limit the possibilities for generalising these results to other primary care populations. Furthermore, this study[10] included only patients with hip pain. Our study fills the gap in presenting HRQL data of patients of all ages with chronic hip or knee complaints in general practice. These data support the effort of the organisers of the Bone and Joint

Decade[9] to determine the burden of musculoskeletal diseases and underscore their statement that the HRQL and overall quality of life of people with hip or knee complaints should be improved.

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Chapter 6
The course and prognosis of knee complaints in general practice

Johanna M. van der Waal, Sandra D.M. Bot, Caroline B. Terwee, Daniëlle A.W.M. van der Windt, Rob J.P.M. Scholten, Lex M. Bouter, Joost Dekker

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Abstract

Knee complaints are frequently presented in general practice. Information about the course and prognosis of knee complaints is needed to inform patients and facilitate decisions on referral and treatment. The objective of the present study was to assess the course of knee complaints and to identify predictors of outcome in patients visiting their general practitioner with a new episode of knee complaints. Data were collected by means of self-administered questionnaires. After three and twelve months of follow-up the following outcomes were assessed: perceived recovery, change in pain and change in physical functioning. As potential predictors of outcome several sociodemographic variables, characteristics of the complaint, baseline scores of the outcome measures, intra- and extra-individual variables were analysed using multiple regression analyses. We included 251 patients with a new episode of knee complaints, presented in general practice. Only 25% reported recovery after three months, increasing to 44% after twelve months. A history of knee complaints, a longer duration of the current episode of knee complaints or co-existing other musculoskeletal complaints, were associated with a worse prognosis. In the linear regression models 41-53% of the variance in pain reduction and improvement in functioning could be explained by the predictors. The area under the ROC curves, estimating predictive accuracy of the Cox regression models concerning perceived recovery was 0.77 after three and 0.72 after twelve months. In conclusion, many patients were not recovered after twelve months. Furthermore, distress was found to be strongly associated with less pain reduction and less improvement in functioning.

Introduction

Knee complaints are a serious problem because of their high prevalence and substantial impact on functional disability, health care costs, sick leave and work disability [1-4]. A recent survey among the Dutch general population showed that the twelve-months period prevalence of knee pain can be estimated at 22% and that this prevalence increases with age [5]. Given the recent demographic changes one may expect that prevalence and incidence will increase in the near future. Approximately 33% of people reporting knee complaints during the preceding year indicated that they had contacted their general practitioner (GP) for these complaints [5]. This means that the GP is frequently confronted with patients with knee complaints. The second Dutch National Survey of General Practice [6] showed that incidence rates of knee complaints presented to the GP are highest among all lower extremity complaints: 21.4 per 1000 person years for women and 22.8 per 1000 person years for men [7].

In Dutch public health care, the GP serves as a gate keeper, as all referrals to specialists, physiotherapists and most other health care providers need to be initiated by a GP. This implies that the GP needs to distinguish complaints with need of specialist care from those that can be managed in primary care. Such decisions require information about the likelihood of developing chronic pain and disability. However, information about predictors of the prognosis of knee complaints is limited.

From the available evidence a few potential predictors of the course of knee complaints can be derived. These include the severity and duration of the complaint, and some intra-individual and extra-individual (environmental) factors like smoking, comorbidity and working status [8-10]. So far, the majority of research has evaluated the predictive value of clinical characteristics (symptoms and signs) whereas little attention has been given to the predictive value of psychosocial factors. Psychosocial variables have been shown to be related to a high risk of chronicity in musculoskeletal illness in general [11;12] and to a decrease in functional status in rheumatoid arthritis [13]. Avoidance of activity has been shown to be associated with disability in patients with osteoarthritis of the knee [14]. Besides other potential predictors, in the present study the predictive value of psychosocial factors such as pain coping, distress, kinesiophobia and social support were also investigated.

The objective of the present study was firstly to assess the course of knee complaints in adult primary care patients and secondly, to identify predictors of outcome in patients reporting a new episode of knee complaints.

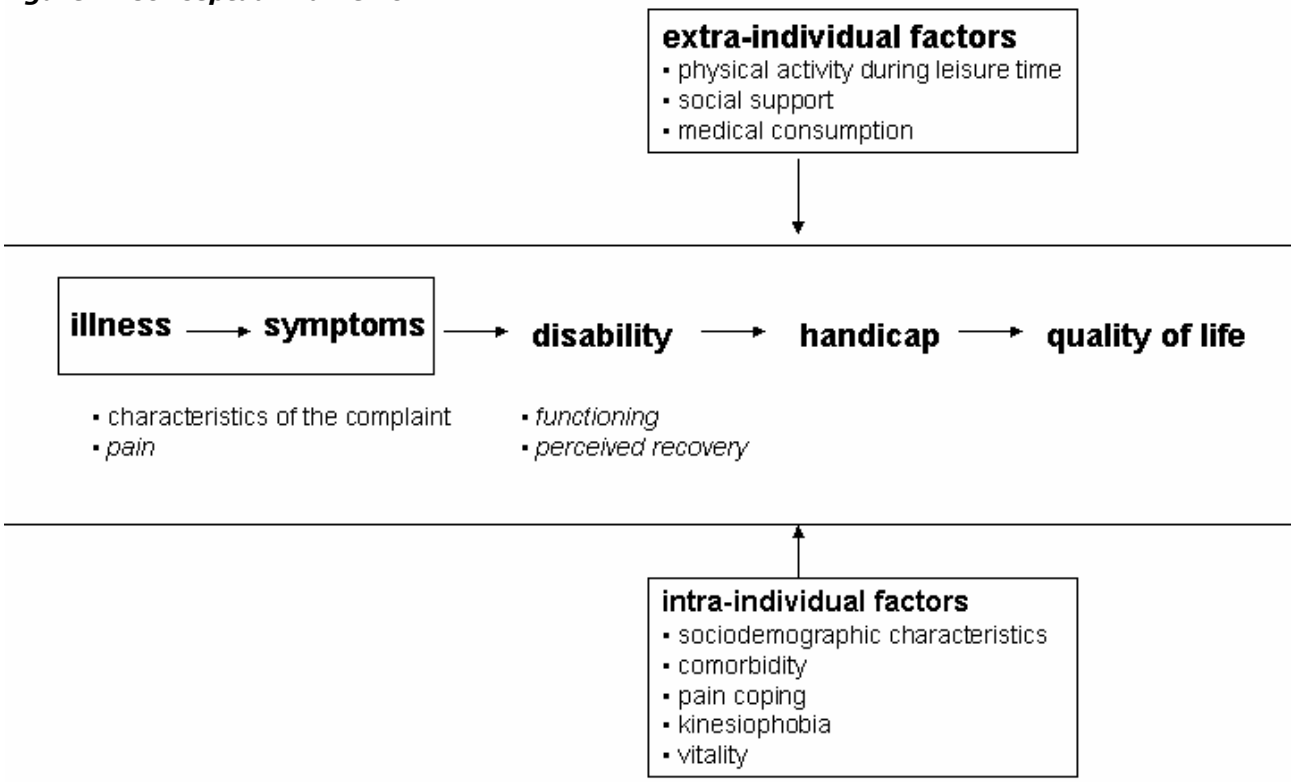
Methods

Design and data collection

Data were obtained from a prospective cohort study conducted in 61 general practices (97 GPs) in the Netherlands. The GPs who participated in this study are considered to be representatives of all Dutch GPs. Part of these GPs participated in the second Dutch National Survey of General Practice, carried out by the Netherlands Institute for Health Services Research in co-operation with the National Information Network of General Practice in 2001 [15]. Patients were eligible for participation in our study if they met the following inclusion criteria: patients visited their GP with a new episode of knee complaints; were 18 years or older, were capable of filling in Dutch questionnaires, and signed informed consent. An episode was considered 'new' if patients had not visited their GP for the same complaint during the preceding three months. Patients were excluded from the study if a fracture, malignancy, prosthesis, amputation or congenital defect was considered to be the cause of the complaint at issue or if a patient was pregnant. Patients who were eligible for participation were informed about the study by their GP and with their approval, their names and addresses were sent to the EMGO Institute. At baseline and after three and twelve months of follow-up, individual patient data were collected by means of self-administered questionnaires. Further details about the design of the study are described elsewhere [16]. The Medical Ethics Committee of the VU University Medical Center approved the study protocol.

The "disablement process" of Verbrugge [17] was used as a framework for studying predictors and outcomes in the present study (Figure 1). This conceptual model describes how chronic and acute conditions affect functioning in specific body systems, fundamental physical and mental actions, and activities of daily life. Furthermore, it describes the intra- and extra-individual factors that may influence physical functioning.

Figure 1. Conceptual framework



Outcome measures

Three outcomes were assessed after three and after twelve months of follow-up. Perceived recovery was measured at three and 12 months of follow-up by asking the following question: "Is the knee complaint, for which you visited your GP three / twelve months ago, still bothering you?" (response options: yes or no). Pain intensity and functioning were measured at baseline and after three and twelve months of follow-up. Pain intensity was measured on an 11-point numerical rating scale (0=no pain, 10=very severe pain). Functioning was measured using the subscale physical functioning of the WOMAC (Western Ontario and McMaster Universities Osteoarthritis Index [18;19]), which was standardized to a score from 0 to 100, with lower scores indicating better functioning. Changes in pain intensity and functioning were calculated by subtracting the three or twelve months follow-up score from the baseline score. Higher change scores indicated less pain or better functioning after three or twelve months of follow-up.

Potential predictors

The baseline questionnaire included questions about a wide range of potential predictors of outcome of knee complaints. These included sociodemographic characteristics, characteristics of the complaint, perceived pain intensity and

functioning, and several intra- and extra- individual factors, described in Table 1.

As sociodemographic characteristics age, gender, body mass index (BMI), smoking, work status, marital status, children (<5 years) in household and education were assessed as potential predictors.

Characteristics of the complaint included questions about duration, location, history, severity and perceived cause of the complaint. Patients were asked what they thought had caused their complaint (e.g. overload, injury, illness). The association of each possible cause with outcome was analysed separately. The baseline scores on the pain scale and the pain, stiffness and physical functioning subscales of the WOMAC were also analysed as potential predictors.

Several intra-individual factors were measured: presence of menopause, use of pain medication, pain coping strategies (six subscales from the Pain Coping Inventory – a higher score indicating more use of the strategy [20]), distress (short-version subscale from the Four Dimensional Symptom Questionnaire – a higher score indicating more distress [21]), kinesiophobia (two subscales, based on items derived from the Tampa Scale [22;23] and the Fear-Avoidance and Beliefs Questionnaire (FABQ [24] – a higher score indicating more kinesiophobia), and quality of life (measured on a 5 point rating scale – a higher score indicating better quality of life). Perceived general health and vitality were measured using subscales from the Medical Outcomes Study 36-item Short Form Health Survey (SF-36 [25] – a higher score indicating better general health or being more vital). Comorbidity was measured using a list of complaints and diseases [26], and co-existing other musculoskeletal complaints were assessed with a checklist.

Several extra-individual factors were measured using the following question(aire)s. To measure physical activity we asked if patients met the Norm for Healthy Activity, which recommends that all adults should accumulate 30 minutes or more of moderate-intensity physical activity on at least five days of the week [27;28]. Furthermore, we measured whether patients met the ACSM position stand, that recommends heavy physical exercise or sports at least three times a week [29]. Social support was measured using the Social Support Scale (SOS [30] – a higher score indicating less social support).

In principle, potential predictors were analysed in their original form as dichotomous or continuous variables. In case of a non-linear relationship of the predictor with the outcome, tertiles were created and the predictor was analysed as a categorical variable. This applied for the following variables: several coping strategies, distress and the two kinesiophobia subscales. The tables show how each of the predictors were analysed.

Statistical analyses

The course of the knee complaints was described by means of descriptive statistics, in terms of perceived recovery (%) and mean changes on the subscales pain, stiffness and physical functioning of the WOMAC.

Multiple regression analyses were used to predict outcome after three and twelve months of follow-up. To predict perceived recovery Cox proportional hazards analysis was used with equal survival times for all subjects. To predict changes in pain intensity and functioning, linear regression analysis was used.

Firstly, univariate analyses were performed in which the association of all potential predictors with the outcome at issue were analysed one by one. All predictors with a $p<0.20$ in the univariate analysis, were included in the multiple regression model. Next, multiple regression models were constructed using a stepwise backwards elimination. Starting with all predictors with a $p<0.20$, the variable showing the least significant association with the outcome was manually excluded from the model. The model was considered complete if all variables in the model showed significance levels less than 0.10. If the number of variables to be entered in the model exceeded n/10, the variables were entered in groups. First all sociodemographic predictors were entered, and all predictors with $p<0.20$ retained. Subsequently predictors concerning characteristics of the complaint were added and finally intra- and extra-individual factors.

To estimate the predictive accuracy of the Cox regression models individual survival functions were calculated and converted into individual probabilities of recovery. These probabilities were used to construct receiver-operating curves (ROC) for which the area under the curve (AUC) (95% CI) was calculated. The proportion of explained variance (R^2) was calculated to assess the goodness of fit of the linear models.

Results

At baseline, 251 patients with a new episode of knee complaints presented in general practice, were enrolled in the study and completed the baseline questionnaire. Of them, 89% returned the questionnaire after three months and 81% after twelve months. Baseline characteristics of the patients are shown in Table 1. The dropouts did not differ from the responders concerning age, sex and baseline pain and WOMAC scores (data not shown).

Table 1. Patient characteristics at baseline (n=251)

Patient characteristics	baseline scores
sociodemographic	
age, in years; mean (SD)	49.3 (16.2)
gender; % male	51%
body mass index (weight/height^2); mean (SD)	26.3 (4.0)
smoking; % present or previous smoker	63%
working; % working	58%
marital status; % living together / married	73%
children; % having children in household	43%
children <5 years; % having children <5 in household	20%
education;	
% primary	34%
% secundary	51%
% college / university	15%
characteristics of the knee complaint	
location of the knee complaint; % one knee	83%
duration of the knee complaint;	
% < 1 week	7.3%
% 1 – 2 weeks	14.2%
% 3 – 4 weeks	15.7%
% 1 – 2 months	15.3%
% 3 – 6 months	16.9%
% > 6 months	30.6%
had knee complaint before; % yes	49%
severity of the knee complaint;	
% almost always bothering	39%
% regularly bothering	24%
% now and then bothering	26%
% not bothering	11%
perceived cause of the knee complaint;	
% overload during usual activities	24%
% overload during unusual activities	8%
% overload during exercise	16%
% injury during exercise	9%
% injury	9%
% stress	3%
% illness	2%
% unknown	25%
% other	26%
baseline scores	
pain on an 11-point numerical rating scale; mean score (SD)	4.4 (2.4)
WOMAC* subscale pain; 0-100; mean score (SD)	37.9 (20.6)
WOMAC subscale stiffness; 0-100; mean score (SD)	38.7 (26.7)
WOMAC subscale functioning; 0-100; mean score (SD)	35.2 (22.6)
intra-individual factors	
menopause; % in menopause	7%
pain medication; % taking pain medication	42%
pain coping	
PCI** subscale 1: pain transformation; 4-16; mean score (SD)	8.1 (2.8)
PCI subscale 2: distraction; 5-20; mean score (SD)	10.3 (3.1)
PCI subscale 3: reducing demands; 3-12; mean score (SD)	6.0 (2.0)
PCI subscale 4: retreating; 7-28; mean score (SD)	10.3 (3.5)
PCI subscale 5: worrying; 9-36; mean score (SD)	14.7 (4.2)
PCI subscale 6: resting; 5-20; mean score (SD)	9.3 (2.8)

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Patient characteristics - continued	baseline scores
distress – 4DSQ† subscale; 0-12; mean score (SD)	3.8 (3.0)
kinesiophobia –1: fear and avoidance of activity; 0-100; mean score (SD)	49.9 (17.0)
kinesiophobia –2: importance of activity; 0-100; mean score (SD)	42.7 (22.8)
perceived general health: question from the SF-36††; 1-5; mean score (SD)	2.6 (0.9)
quality of life; 5-point numerical rating scale; mean score (SD)	2.5 (0.8)
vitality; subscale from the SF-36; 0-100; mean score (SD)	64.1 (16.6)
co-existing musculoskeletal complaints;	
only a knee complaint	44%
more complaints of the lower extremities	9%
musculoskeletal complaints of both upper and lower extremities	47%
comorbidity; % yes	39%
extra-individual factors	
ACSM position stand; % meet the norm	17%
norm for healthy activity; % meet the norm	42%
social support; Social Support Scale; 12-60; mean score (SD)	18.6 (7.5)

**Western Ontario and McMaster Universites Osteoarthritis index, **Pain Coping Inventory. †Four Dimensional Symptom Questionnaire, ††Medical Outcomes Study 36-item Short Form Health Survey*

Course of knee complaints

After three months of follow-up, 25% of the patients indicated that they had recovered from their complaints. This proportion increased to 44% after twelve months.

The course of pain intensity is shown in Figure 2. This figure shows a statistically significant ($p<0.01$) mean reduction of pain intensity of 1.4 points after three months, which is a 32% improvement from baseline. After twelve months of follow-up a mean reduction of 2.1 points (47%) from baseline was seen, which was statistically significant compared to baseline scores and scores after three months of follow-up (both $p<0.01$).

Figure 2. Mean score and SD of pain (range 0-10) in patients with knee complaints in general practice at baseline and follow-up

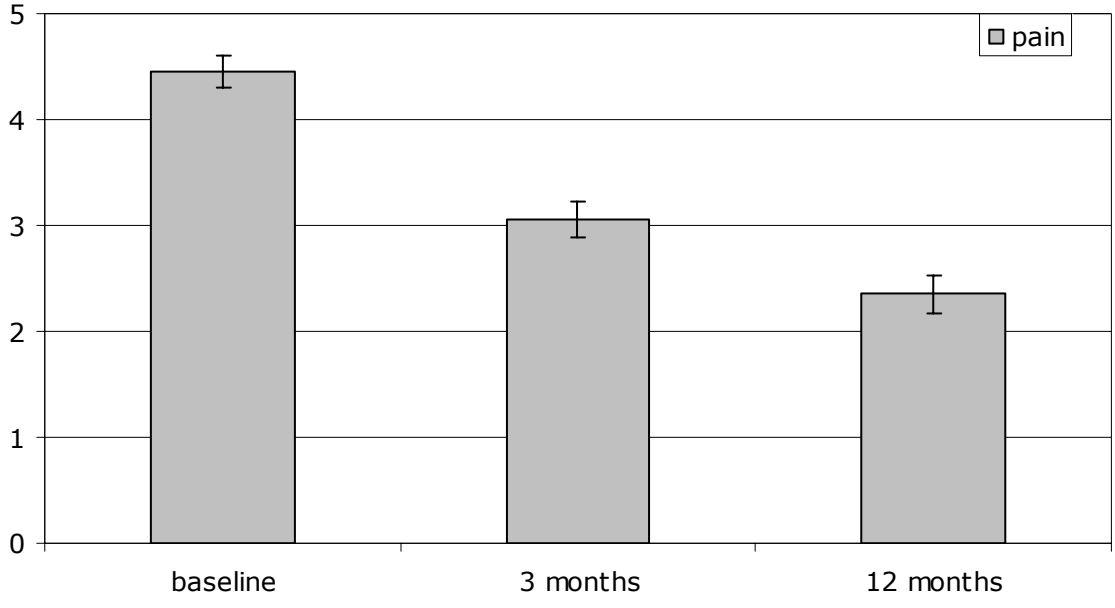
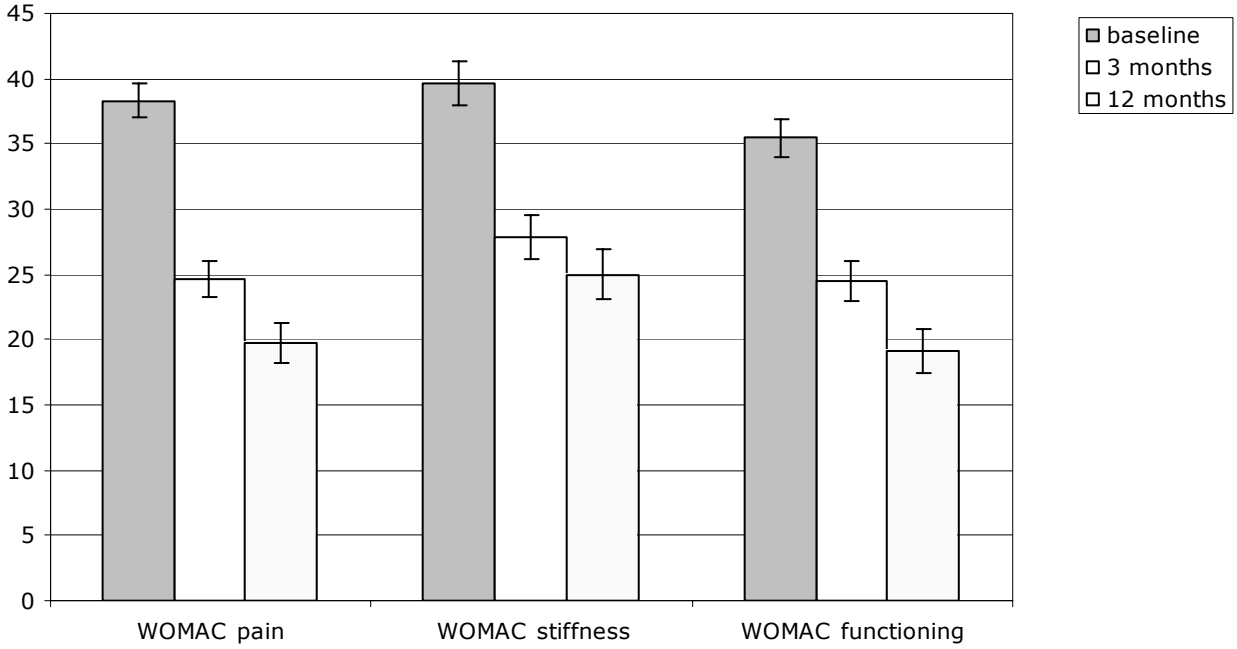


Figure 3 shows the course of the WOMAC scores. All subscales showed statistically significant improvements after three and twelve months ($p<0.01$). After three months the mean WOMAC pain score had improved by 36% and after twelve months by 48%. WOMAC functioning was improved by 31% after three months and 46% after twelve months. The mean WOMAC stiffness score had improved by 30% after three months and 37% after twelve months. After twelve months the mean WOMAC stiffness score was not statistically different from the mean score at three months of follow-up.

Figure 3. Mean WOMAC scores (range 0-100) and SD in patients with knee complaints in general practice



Predictors of outcome

Table 2 presents the variables that showed a significant association with recovery, a change in pain intensity or a change in functioning in the univariate analyses after three or twelve months. These predictors were considered in the multivariate analyses. Age, the duration of the knee complaint, having had previous episodes of knee complaints, severity of the knee complaint as well as co-existing other musculoskeletal complaints showed a statistically significant association with all outcome measures both after three and after twelve months.

Table 2 Results of the univariate analyses: significant predictors (p<0.20), entered in multiple regression analysis

	after 3 months			after 12 months		
sociodemographic	recovery HR* (95% CI)	change in pain b** (95% CI)	change in functioning b** (95% CI)	recovery HR* (95% CI)	change in pain b** (95% CI)	change in functioning b** (95% CI)
age	0.98 (0.97 – 1.00)		-0.21 (-0.40 – -0.03)			-0.29 (-0.48 – 0.09)
gender	0.55 (0.32 – 0.94)	0.70 (-1.41 – 0.01)	-4.79 (-10.79 – 1.21)			
body mass index (BMI)				0.95 (0.90 – 1.01)		
BMI >30		0.84 (-0.13 – 1.81)			1.02 (-0.03 – 2.07)	5.47 (-2.80 – 13.74)
working						4.26 (-2.09 – 10.61)
having children			5.92 (-0.20 – 12.03)	1.34 (0.88 – 2.03)		7.54 (1.23 – 13.85)
having children <5 years					1.43 (-0.29 – 3.15)	
education (higher vs lower)				1.58 (0.87 – 2.85)		
characteristics of the knee complaint						
location of the knee complaint	0.37 (0.13 – 1.01)			0.35 (0.15 – 0.80)	-1.03 (-2.08 – 0.01)	
duration of the knee complaint	0.76 (0.65 – 0.89)	-0.20 (-0.42 – 0.02)	-3.75 (-5.55 – -1.94)	0.85 (0.75 – 0.96)	-0.19 (-0.43 – 0.05)	-3.74 (-5.57 – 1.91)
had knee complaint before	0.39 (0.22 – 0.69)	-0.73 (-1.44 – -0.02)	-6.03 (-12.01 – -0.05)	0.47 (0.30 – 0.74)	-1.19 (-1.97 – -0.41)	-8.97 (-15.12 – -2.82)
severity of the knee complaint	1.45 (1.13 – 1.86)			1.31 (1.09 – 1.59)	0.29 (-0.09 – 0.66)	
cause: overload during usual activities		0.56 (-0.28 – 1.40)				
cause: overload during unusual activities		-1.65 (-2.99 – -0.32)				
cause: overload during exercise						-7.71 (-16.46 – 1.05)
cause: injury during exercise		1.17 (-0.10 – 2.45)		1.60 (0.87 – 2.94)	1.19 (-0.20 – 2.58)	9.86 (-1.06 – 20.78)
cause: illness		-2.24 (-4.44 – -0.04)				
cause: other				0.62 (0.36 – 1.07)		
baseline scores of outcome measures						
pain	0.92 (0.83 – 1.03)	0.59 (0.46 – 0.73)	2.75 (1.53 – 3.98)	0.92 (0.98 – 1.00)	0.61 (0.46 – 0.75)	3.08 (1.82 – 4.35)
WOMAC pain		0.04 (0.02 – 0.06)	0.34 (0.20 – 0.47)	0.99 (0.98 – 1.00)	0.28 (0.01 – 0.05)	0.33 (0.19 – 0.48)
WOMAC stiffness	0.99 (0.98 – 1.00)	0.02 (0.01 – 0.03)	0.22 (0.11 – 0.33)	0.99 (0.98 – 1.00)		0.14 (0.02 – 0.25)
WOMAC function		0.04 (0.02 – 0.05)	0.53 (0.42 – 0.64)	0.99 (0.98 – 1.00)	0.02 (0.00 – 0.04)	0.47 (0.35 – 0.59)
intra-individual variables						
being in menopause	2.60 (1.00 – 6.76)					
taking pain medication						-4.74 (-11.05 – 1.57)
PCI1: pain transformation-middle vs lowest tertile		0.95 (0.10 – 1.80)	6.45 (-0.80 – 13.71)			2.70 (-4.60 – 9.99)
highest vs lowest tertile		0.25 (-0.67 – 1.17)	2.57 (-5.23 – 10.38)			5.54 (-2.63 – 13.71)
PCI2: distraction-middle vs lowest tertile	0.72 (0.38 – 1.35)			0.81 (0.49 – 1.34)	-0.01 (-0.98 – 0.96)	
highest vs lowest tertile	0.60 (0.32 – 1.14)			0.69 (0.41 – 1.15)	-1.09 (-2.05 – -0.14)	
PCI3: reducing demands-middle vs lowest tertile			1.37 (-6.74 – 9.48)			7.07 (-1.01 – 15.14)
highest vs lowest tertile			7.31 (0.46 – 14.16)			10.50 (3.55 – 17.45)
PCI4: retreating-middle vs lowest tertile		0.39 (-0.54 – 1.32)	5.74 (-2.14 – 13.62)		0.81 (-0.21 – 1.83)	11.48 (3.48 – 19.48)

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Table 2 continued – Results of the univariate analyses: significant predictors (p<0.20), entered in multiple regression analysis

highest vs lowest tertile		0.68 (-0.15 – 1.51)	6.97 (-0.02 – 13.94)		0.23 (-0.68 – 1.13)	6.92 (-0.11 – 13.95)
PCI5: worrying-middle vs lowest tertile						0.50 (-7.19 – 8.19)
highest vs lowest tertile						5.15 (-2.35 – 12.65)
distress-middle vs lowest tertile		0.38 (-0.50 – 1.27)	3.12 (-4.35 – 10.59)		-0.20 (-1.18 – 0.78)	2.53 (-5.22 – 10.28)
highest vs lowest tertile			-10.64 (-24.58 – 3.30)		-3.68 (-5.82 – -1.54)	-24.35 (-41.25 – -7.46)
kinesiophobia - fear and avoidance of activity						
middle vs lowest tertile		0.68 (-0.17 – 1.52)	6.62 (-0.51 – 13.74)			0.65 (-6.75 – 8.05)
highest vs lowest tertile		-0.16 (-1.06 – 0.73)	6.63 (-0.87 – 14.14)			6.55 (-1.22 – 14.33)
kinesiophobia - importance of exercise						
middle vs lowest tertile		0.69 (-0.19 – 1.57)				
highest vs lowest tertile		0.23 (-0.64 – 1.09)				
general health				0.80 (0.64 – 1.01)		
quality of life				0.76 (0.59 – 0.99)	-0.50 (-0.99 – 0.00)	
vitality				1.02 (1.00 – 1.03)	0.02 (0.00 – 0.05)	
co-existing musculoskeletal complaints						
lower extr.comp. vs only knee comp.	0.69 (0.24 – 1.94)	-0.73 (-2.10 – 0.64)	-8.21 (-19.69 – 3.28)	0.81 (0.36 – 1.78)	-0.83 (-2.32 – 0.67)	-10.07 (-21.78 – 1.63)
lower and upper vs only knee comp.	0.58 (0.33 – 1.02)	-0.56 (-1.31 – 0.19)	-4.83 (-11.12 – 1.46)	0.75 (0.48 – 1.16)	-0.77 (-1.60 – 0.07)	-6.72 (-13.26 – -0.18)
comorbidity				0.60 (0.38 – 0.96)	-0.78 (-1.59 – 0.03)	-4.34 (-10.77 – 2.10)
extra-individual variables						
ACSM position stand	1.56 (0.85 – 2.85)	0.73 (-0.21 – 1.67)	6.66 (-1.25 – 14.58)	1.69 (1.04 – 2.76)		
norm for healthy activity		0.52 (-0.21 – 1.24)		1.37 (0.91 – 2.08)	0.62 (-0.17 – 1.42)	
social support	0.96 (0.91 – 1.00)	0.05 (-0.10 – 0.00)	-0.64 (-1.05 – -0.22)		-0.05 (-0.11 – 0.01)	-0.40 (-0.84 – 0.04)

HR: Hazard Ratio, b: regression coefficient, CI: Confidence Interval, vs: versus, extr: extremities, comp.:complaint(s), WOMAC: Western Ontario and McMaster Universites Osteoarthritis index, PCI: Pain Coping Inventory, ACSM: American College of Sports Medicine
**HR < 1.00 = a reduced probability of recovery compared to the reference group; a HR > 1.00 = an increased probability of recovery compared to the reference group;*
***b > 0 = greater reduction in pain or more improvement in functioning, b < 0 = less reduction in pain or less improvement in functioning*

Predictors of outcomes after three months

Table 3 presents the variables that were independently associated with outcome in the multivariate models predicting recovery, change in pain intensity and change in functioning after three months. Regarding recovery after three months, four variables were significant predictors of a favourable outcome after three months: being male, shorter duration of the knee complaint, lower score on WOMAC stiffness (i.e. less stiffness) at baseline and being in menopause. The area under the ROC curve was 0.77 (95% confidence interval: 0.71 – 0.84).

With respect to a change in pain intensity, the following variables were significant predictors of a favourable outcome (larger reduction in pain intensity) after three months: being male, BMI above 30, shorter duration of the knee complaint, perceived cause was overload during usual activities, perceived cause was no overload during unusual activities, more pain at baseline, less distress, no co-existing musculoskeletal complaints and meeting the ACSM position stand. The multiple regression model explained 43% of the variance of change in pain intensity.

Table 3 Predictors of recovery (AUC=0.77), change in pain intensity (R^2=0.43) and change in functioning (R^2=0.53) after three months

		recovery			change in pain intensity			change in functioning		
sociodemographic	analysis	HR*	95% CI	p	b**	95% CI	p	b**	95% CI	p
age	continuous in years							-0.21	-0.36 – -0.06	0.01
female	vs. male	0.43	0.23 – 0.79	0.01	-1.01	-1.60 – -0.42	0.00	-8.00	-12.53 – -3.46	0.00
BMI >30	vs. BMI ≤30				0.86	0.06 – 1.67	0.04			
characteristics of the knee complaint										
duration of the knee complaint	continuous	0.73	0.62 – 0.86	0.00	-0.25	-0.44 – -0.07	0.01	-2.58	-4.01 – -1.15	0.00
cause: overload during usual activities	vs. not				0.67	-0.04 – 1.37	0.06			
cause: overload during unusual act.	vs. not				-1.09	-2.19 – 0.02	0.05			
baseline scores										
pain	continuous				0.65	0.53 – 0.78	0.00			
WOMAC pain	continuous							-0.21	-0.39 – -0.04	0.02
WOMAC stiffness	continuous	0.99	0.98 – 1.00	0.00						
WOMAC functioning	continuous							0.82	0.66 – 0.99	0.00
intra-individual										
being in menopause	vs. not	2.94	1.13 – 7.67	0.03						
PCI3:reducing demands										
- middle tertile	vs. lowest tertile							-5.79	-11.91 – 0.34	0.06
- highest tertile	vs. lowest tertile							-0.39	-5.54 – 4.76	0.88
distress - middle tertile	vs. lowest tertile				0.44	-0.29 – 1.16	0.24	0.29	-5.38 – 5.95	0.92
- highest tertile	vs. lowest tertile				-1.66	-3.06 – -0.26	0.02	-17.40	-29.10 – -5.70	0.00
co-existing complaints lower extr.	vs. only knee complaint				-1.20	-2.36 – -0.03	0.04	-2.65	-11.52 – 6.22	0.56
complaints of upper and lower extr.	vs. only knee complaint				-1.07	-1.72 – -0.41	0.00	-5.19	-10.36 – -0.03	0.05
extra-individual										
meeting ACSM position stand	vs. not meeting norm				0.77	-0.01 – 1.55	0.05	5.83	-0.20 – 11.87	0.06
social support	continuous							-0.30	-0.63 – 0.03	0.08

HR: Hazard Ratio, b: regression coefficient, CI: Confidence Interval, vs: versus, extr: extremities, WOMAC: Western Ontario and McMaster Universites Osteoarthritis index, PCI: Pain Coping Inventory, ACSM: American College of Sports Medicine
**HR < 1.00 = a reduced probability of recovery compared to the reference group; a HR > 1.00 = an increased probability of recovery compared to the reference group*
***b > 0 = greater reduction in pain or more improvement in functioning, b < 0 = less reduction in pain or less improvement in functioning*

Concerning a change in functioning, the following variables were significant predictors of a favourable outcome (more improvement in functioning) after three months: younger age, being male, shorter duration of the knee complaint, lower score on WOMAC pain (i.e. less pain) at baseline, higher score on WOMAC functioning (i.e. worse functioning) at baseline, low score on the pain coping subscale "reducing demands", no co-existing musculoskeletal complaints, meeting the ACSM position stand and having more social support. The multiple regression model explained 53% of the variance of change in functioning.

Predictors of outcomes after twelve months

Table 4 presents the variables that were independently associated with outcome in the models predicting recovery, change in pain intensity and change in functioning after twelve months.

Regarding recovery after twelve months, two variables were significant predictors of a favourable outcome after twelve months: no previous episodes of knee complaints and a lower score on WOMAC pain (i.e. less pain) at baseline. The area under the ROC curve was 0.77 (95% confidence interval: 0.66 – 0.79).

Table 4 Predictors of recovery (AUC=0.72), change in pain intensity (R^2=0.41) and change in functioning (R^2=0.44) after twelve months

		recovery			change in pain			change in functioning		
sociodemographic	analysis	HR*	95% CI	p	b**	95% CI	p	b**	95% CI	p
age	continuous in years							-0.29	-0.45 – 0.12	0.00
characteristics of the knee complaint										
duration of the knee complaint	continuous							-2.71	-4.19 – -1.24	0.00
had knee complaint before	vs. not	0.51	0.33 – 0.81	0.00	-1.31	-1.94 – -0.67	0.00			
cause: injury during exercise	vs. not				0.98	-0.12 – 2.08	0.08			
baseline scores										
pain	continuous				0.69	0.55 – 0.82	0.00			
WOMAC pain	continuous	0.99	0.98 – 1.00	0.02						
WOMAC stiffness	continuous							-0.16	-0.29 – -0.03	0.02
WOMAC functioning	continuous							0.65	0.50 – 0.80	0.00
intra-individual										
PCI2: distraction - middle tertile	vs. lowest tertile				-0.32	-1.10 – 0.47	0.43			
- highest tertile	vs. lowest tertile				-1.02	-1.80 – -0.24	0.01			
PCI4: retreating - middle tertile	vs. lowest tertile							6.54	0.18 – 12.89	0.04
- highest tertile	vs. lowest tertile							2.61	-3.11 – 8.33	0.37
distress - middle tertile	vs. lowest tertile				-0.34	-1.15 – 0.48	0.42	-1.72	-7.88 – 4.45	0.59
- highest tertile	vs. lowest tertile				-2.03	-3.93 – -0.12	0.04	-28.16	-42.41 – -13.90	0.00
vitality	continuous				0.02	0.00 – 0.04	0.03			

HR: Hazard Ratio, b: regression coefficient, CI: Confidence Interval, vs: versus, WOMAC: Western Ontario and McMaster Universites Osteoarthritis index, PCI: Pain Coping Inventory, ACSM: American College of Sports Medicine
**HR < 1.00 = a reduced probability of recovery compared to the reference group; a HR > 1.00 = an increased probability of recovery compared to the reference group*
***b > 0 = greater reduction in pain or more improvement in functioning, b < 0 = less reduction in pain or less improvement in functioning*

With respect to a change in pain intensity, the following variables were significant predictors of a favourable outcome (greater reduction in pain intensity) after twelve months: no previous episodes of knee complaints, perceived cause was injury during exercise, more pain at baseline, low score on the pain coping subscale "distraction", less distress and higher vitality scores at baseline. The multiple regression model explained 41% of the variance of change in pain intensity.

Concerning a change in functioning, the following variables were significant predictors of a favourable outcome (more improvement in functioning) after twelve months: younger age, being male, shorter duration of the knee complaint, lower score on WOMAC stiffness (i.e. less stiffness) at baseline, higher score on WOMAC functioning (i.e. worse functioning) at baseline, medium score on the pain coping subscale "retreating" and less distress. The multiple regression model explained 44% of the variance of change in functioning.

Discussion

In the present study, the course of knee complaints presented in general practice was described and predictors of outcome were identified. The results showed that less than half of the patients with knee complaints reported recovery after one year of follow-up. Despite this low recovery rate, patients showed a mean reduction in pain intensity of 47% and a mean improvement in functioning of 46% after twelve months of follow-up.

Different predictors were found of the various outcomes at follow-up, but not one single variable could be found that predicted a better prognosis for all outcome measures at three and twelve months of follow-up. A study on patients with low back pain has also found prognostic factors to differ when varying outcome measures or different moments of follow-up were used [31]. We found similar results in patients with hip and upper extremitiy compaints (data submitted for publication). This may be caused by different mechanisms that may underlie the recovery of pain and disability in patients with musculoskeletal complaints.

As expected, patients with more pain at baseline experienced more pain reduction compared to patients with less pain at baseline. Similarly, patients with worse physical functioning at baseline experienced more improvement in physical functioning compared to those with better baseline physical functioning. We assume that this finding can be explained by the fact that there is more room for improvement in patients with higher scores at baseline.

A peculiar finding was that patients with a BMI > 30 experienced more pain reduction after three months than patients with a BMI $\leq$ 30.This finding was unexpected since previous research has demonstrated that a higher BMI is

associated with more knee pain or more joint pain in general [32;33]. The cross-sectional associations found in the studies of Pountain and Aoyagi may not necessarily hold when studying longitudinal changes in pain, but it is difficult to offer a plausible explanation for better outcome in patients with a high BMI. Since the effect of a high BMI found in our study was small (less than one point on the pain scale, ranging from 0-10), this association may be a coincidental finding.

A longer duration of the knee complaint was associated with worse outcomes on all outcome measures after three months and with less improvement in functioning after twelve months. Previous episodes of knee complaints were also associated with a poor prognosis concerning pain and recovery after twelve months. In addition, more stiffness at baseline was associated with less improvement in functioning after twelve months and a lower probability of recovery after three months. These associations confirm finding from previous research and may indicate that these patients may suffer from chronic conditions such as osteoarthritis or the consequences of knee injuries. These conditions have often been found to account for a worse prognosis [34-37]. In our study we were unable to collect information on medical diagnoses, so this hypothesis could not be tested.

Some perceived causes of the complaint turned out to be significant predictors of a change in pain intensity. Patients who thought that the cause of their complaint was an injury or overload during usual activities, showed more reduction in pain after three or twelve months than patients who did not consider these circumstances to be a probable cause of their complaint. Patients who thought that overload during unusual activities caused their complaint, showed less pain reduction after three months. We had expected, however, that overload during unusual activities would be correlated with a favourable outcome, since unusual activities can more easily be avoided than usual activities. The effects were not very large and of borderline significance (Tables 3 and 4). Therefore, we feel that not too much weight should be given to our findings regarding perceived cause. These findings should be replicated in future studies.

To our knowledge, no previous studies have investigated the influence of psychosocial predictors on the prognosis of knee complaints in a general practice population. In our study, several pain coping strategies turned out to be significant predictors. Less improvement in functioning after three months was found for patients who scored high on the (active) pain coping strategy "reducing demands" (e.g. "I continue activities with less effort"), and less pain reduction after twelve months was found for patients who scored high on the (active) pain coping strategy "distraction" (e.g. "I do something I find pleasant"). In addition, more improvement in functioning was found for patients who scored high on the (passive) pain coping strategy "retreating"

(e.g. "I retreat into a restful environment"). These findings seem to be in contrast with results of previous studies, which found active coping strategies to facilitate a better prognosis than passive coping strategies [38;39]. We recommend further research on this subject to unravel the influence of different coping styles on recovery in relevant subgroups of patients with musculoskeletal problems.

High levels of distress predicted a poor outcome of pain and functioning, both after three and after twelve months. Patients with the highest levels of distress showed a smaller mean reduction in pain (2 points on a scale from 0-10) and a smaller mean improvement of functioning (28 points on a scale from 0-100) than patients with the lowest levels of distress after twelve months (Table 4). Other studies have found similar results in patients with other musculoskeletal complaints. Psychological distress was found to predict persistent pain in patients with musculoskeletal illness, presented in primary care [11;40]. Furthermore, psychological distress was reported to be univariately associated with functional state in patients suffering from osteoarthritis of the knee [41]. In addition, distress has been shown to predict functional outcome after total knee replacement surgery [42] and to predict disability in patients with knee osteoarthritis [43]. As baseline levels of distress turned out to be such a strong predictor in our study it might be considered for intervention. It might be interesting to investigate whether early intervention aimed at reducing distress can prevent persistent pain and functional problems in patients with knee complaints in a primary care setting.

Our study has certain limitations. In the analyses we did not include occupational factors as potential predictors of outcome, although these factors have been shown to be risk factors for the occurrence of knee OA [44]. We did not examine these factors because 42% of the patients in our study did not have paid work. Our objective was to develop models that can be applied to most patients with knee complaints in a general practice population. Examining occupational factors would create models that would not be relevant to nearly half of the patients seen by the GP.

Furthermore, our study population was rather heterogeneous and included patients with many different types of knee complaints. The predictors that we identified apply to all patients in our study. Different additional predictors of outcome may apply to different subgroups of patients. Identification of such subgroup-specific predictors may further enhance the predictive validity of the models. However, our study did not contain enough patients to perform analyses in relevant subgroups.

Although the content of the six models shows some variation, our study adds information that is relevant to the management of knee complaints in general practice. The results may help GPs to provide patients with more accurate information regarding their prognosis. Patients, who have had

previous episodes of knee complaints, have their complaint for a longer time period, and report co-existing other musculoskeletal complaints, unfortunately seem to have a worse prognosis. Distress turned out to be a strong predictor of changes in pain and functioning, both after three and twelve months. Decreasing the patients' level of distress may possibly improve the prognosis of patients with knee complaints. However, we wish to stress that, due to the observational design of our study, these results provide only preliminary evidence regarding a causal association between distress and recovery from knee complaints. Experimental studies are needed to test the hypotheses that reducing distress will lead to better outcomes.

Our findings are in agreement with the attempt that is being made to increase the attention of GPs for this kind of complaints [45]. The western population is ageing and more people suffer from lower extremity complaints, especially knee pain. This study showed that most patients still suffered from their knee pain after one year. Since knee pain has a substantial impact on people's lives [46] and on their use of primary health-care resources [47], the need to identify practical and effective means of reducing this burden should be a priority for research and development in primary care. Future research should focus not just on physical interventions, but also on psychological interventions. Psychological distress might be considered to be a focus for future intervention studies.

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Chapter 7
The course and prognosis of hip complaints in general practice

Johanna M. van der Waal, Sandra D.M. Bot, Caroline B. Terwee, Daniëlle A.W.M. van der Windt, Lex M. Bouter, Joost Dekker

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Abstract

Objective. The purpose of this study was to investigate the course and to identify relevant prognostic indicators of outcome in patients with hip complaints presented in general practice.

Methods. Data were collected by means of self-administered questionnaires containing questions about sociodemographic variables, characteristics of the complaints and several intra- and extra-individual factors. Three outcome measures were assessed after three and twelve months of follow-up: perceived recovery, change in pain intensity and change in functioning. Multiple regression analyses were performed to investigate the association between the potential prognostic indicators and the three outcome measures.

Results. The study included 139 patients with hip complaints, presented in general practice. Only 24% reported recovery after three months, increasing to 37% after twelve months. A history of hip complaints, a longer duration of the current episode of hip complaints, or more severe complaints, were associated with a less favourable prognosis. Furthermore, more vital patients and patients who met the Norm for Healthy Activity had a higher probability of a favourable outcome. In the linear regression models 46-60% of the variance in pain reduction and improvement in functioning could be explained by the predictors. The area under the ROC curves, estimating predictive accuracy of the Cox regression models concerning perceived recovery was 0.91 after three months and 0.89 after twelve months.

Conclusion. Several characteristics of the hip complaint predicted prognosis after 3 and 12 months. Furthermore, several psychosocial factors, e.g. pain coping, were associated with outcome after 3 or 12 months.

Introduction

Hip pain is a common health problem. A recent survey among the Dutch general population showed that the 12-months period prevalence of hip pain can be estimated at 13% and that this prevalence strongly increases with age[1]. Other surveys in the United States and the United Kingdom reported point prevalences of hip pain up to 19% among adults aged 65 yr and older[2-4]. About 33% of people reporting hip complaints during the preceding year indicated that they had contacted their general practitioner (GP) for these complaints[5]. This means that the GP is frequently confronted with these complaints. Furthermore, because the population is ageing, one may expect that prevalence and incidence will increase in the near future. The overall impact of hip complaints on several aspects of health can be substantial, especially on physical functioning and pain[6;7], but also on health-related quality of life[8]. In addition, hip complaints account for a substantial amount of health care costs, sick leave and work disability[9-11]. All these aspects indicate that hip complaints have a substantial impact on different aspects of society.

In Dutch public health care the GP needs to initiate referrals to most other health care providers. Therefore, the GP needs to discriminate complaints with need of specialist care from those that can be managed in primary care. Such decisions require information about the risk of developing chronic pain and disability in relevant subgroups of patients. Knowledge about prognostic indicators can provide information about relevant subgroups. However, no previous research has studied prognostic indicators for the course of hip complaints in a primary care population.

Most research concerning hip complaints or hip osteoarthritis has been based in hospital settings or has studied risk factors for the onset of complaints [12-15]. Nevertheless, some potential prognostic indicators of outcome can be derived from the available evidence. These include severity and duration of the complaint, and some intra-individual and extra-individual (environmental) factors like smoking, comorbidity and working status [12-15]. So far, the greater part of research has evaluated the prognostic value of clinical characteristics (symptoms and signs) whereas little attention has been given to the potential prognostic value of psychosocial factors. Psychosocial variables have been shown to be related to a high risk of chronicity in musculoskeletal illness in general[16;17], and to a decrease in functional status in rheumatoid arthritis[18]. Besides other prognostic indicators, in the present study the prognostic value of psychosocial variables such as pain coping, distress, kinesiofobia and social support were investigated.

The aims of the present study were to describe the course of hip complaints in patients presented in general practice and to identify prognostic indicators of outcome in patients reporting a new epidsode of hip complaints.

Methods

Design and data collection

A prospective cohort study was conducted in 61 general practices (97 GPs). The GPs who participated in this study form a random sample of all Dutch GPs. Half of these GPs participated in the second Dutch National Survey of General Practice carried out by the Netherlands Institute for Health Services Research in co-operation with the National Information Network of General Practice in 2001[19]. Patients who visited their general practitioner with a new episode of hip complaints were eligible for participation in the study if they met the following inclusion criteria: 18 years or older, capable of filling in Dutch questionnaires, and signed informed consent. If patients had not visited their GP for the same complaint during the preceding 3 months, their complaint was considered 'new'. Patients were excluded from the study if a patient was pregnant or if the cause of the complaint at issue was assumed to be a fracture, malignancy, prosthesis, amputation or congenital defect. Names and addresses of eligible and interested patients, were sent to our institute. Individual patient data were collected by means of self-administered questionnaires at baseline and after 3 and 12 months of follow-up. The design of the study has been described in further detail elsewhere[20]. The study protocol was approved by the Medical Ethics Committee of the VU University Medical Center.

Outcome measures

After three and after twelve months of follow-up, three outcome measures were assessed and used to predict prognosis: perceived recovery, changes in pain and changes in functioning. To measure perceived recovery, the following question was asked: "Is the hip complaint, for which you visited your GP 3 / 12 months ago, still bothering you?" (response options: yes or no). At baseline and after 3 and 12 months of follow-up, pain and functioning were measured. An 11 point numerical rating scale was used to measure pain, with higher scores indicating more pain. Functioning was measured using the subscale physical functioning of the WOMAC (Western Ontario and McMaster Universities Osteoarthritis Index[21;22]), which was standardized to a score from 0 to 100, with higher scores indicating poorer functioning. By subtracting the 3 or 12 months follow-up score from the baseline score, changes in pain and functioning were calculated. Higher change scores indicated more reduction in pain or more improvement in functioning after 3 or 12 months of follow-up.

Potential prognostic indicators

A wide range of possible prognostic indicators were considered. The baseline questionnaire included sociodemographic characteristics, characteristics of the

complaint, perceived pain and functioning, and several intra- and extra-individual factors, described in Table 1.

Sociodemographic characteristics, i.e. age, gender, body mass index (BMI), smoking, working, marital status, children (<5 years) in household, and education were assessed as potential prognostic indicators. Characteristics of the complaint included questions about duration, location, history, severity and perceived cause of the complaint. Patients were asked what they thought had caused their complaint (e.g. injury, work, ageing, disease). The association of each possible cause with outcome was analysed separately. The baseline scores on the pain scale and the pain, stiffness and physical functioning subscales of the WOMAC were also analysed as potential predictors.

Several intra-individual prognostic indicators were assessed. Single questions were used to assess the presence of menopause and use of pain medication. Pain coping strategies were measured using six subscales of the Pain Coping Inventory[23;24] with higher scores indicating more use of the strategy concerned. Distress was assessed using a shortened version of the subscale distress from the Four Dimensional Symptom Questionnaire[25] with higher scores indicating more distress. Kinesiophobia was measured using two subscales derived from the Tampa Scale[26;27] and Fear-Avoidance and Beliefs Questionnaire (FABQ[28], with higher scores indicating more kinesiophobia. A 5 point rating scale was used to measure quality of life with higher scores indicating better quality of life. Perceived general health and vitality were measured using subscales from the SF-36 (Medical Outcomes Study 36-item Short Form Health Survey[29]) with a higher score indicating better general health or being more vital. A list of complaints and diseases[30] was included in the baseline questionnaire to measure comorbidity. In addition, co-existing other musculoskeletal complaints were assessed.

A number of extra-individual prognostic indicators were measured using the following question(aire)s. The Norm for Healthy Activity was used to measure physical activity. This norm recommends that all adults should accumulate 30 minutes or more of moderately intensive physical activity on at least five days of the week[31;32]. Furthermore, the ACSM position stand was used, that recommends heavy physical exercise or sports at least 3 times a week[33]. We measured if patients met the norm. The Social Support Scale (SOS)[34] was used to measure social support, with higher scores indicating less social support.

At first, all prognostic indicators were analysed as dichotomous or continuous variables. Tertiles were created in case of a non-linear relationship of the prognostic indicator with the outcome. The prognostic indicator was then analysed as a categorical variable. This concerned the following variables: several coping strategies, distress, vitality and the two kinesiophobia

subscales. Tables 3 and 4 show how each of the prognostic indicators were analysed: as a dichotomous, continuous variable or categorical variable.

Statistical analyses

Descriptive statistics were used to describe the course of the hip complaints. Perceived recovery (%), and mean changes on the subscales pain, stiffness and physical functioning of the WOMAC were calculated.

To predict outcome after 3 and 12 months of follow-up multiple regression analyses were used. To predict perceived recovery Cox proportional hazards analysis was used with equal survival time for all subjects. Linear regression analysis was used to predict change in pain and functioning.

To begin with, the association of all possible prognostic indicators with the outcome were analysed one by one in univariate analyses. All prognostic indicators with a $p<0.20$ in the univariate analysis, were included in the multiple regression model. After that, prognostic models were constructed using a stepwise backwards procedure. Starting with with all prognostic indicators with a $p<0.20$, the variable showing the least significant association with the outcome was manually excluded from the model. The model was considered complete if all variables in the model showed significance levels less than 0.10. If the number of prognostic indicators to be entered in the model exceeded n/10, the prognostic indicators were entered in groups. First all sociodemographic prognostic indicators were entered, and all prognostic indicators with $p<0.20$ retained. Subsequently, prognostic indicators concerning characteristics of the complaint were added and finally prognostic indicators concerning intra- and extraindividual factors.

To assess the goodness of fit of the linear models the proportion of explained variance (R^2) was calculated. To estimate the predictive accuracy of the Cox regression models individual survival functions were calculated and converted into individual probabilities of recovery. These probabilities were used to construct receiver operating curves (ROC) in which areas under the curve (AUC) (95% CI) were calculated.

Results

We included 139 patients who presented with a new episode of hip complaints in general practice and completed the baseline questionnaire. Of them, 89% returned the questionnaire after 3 months and 80% returned the questionnaire after 12 months. Baseline characteristics of the patients are shown in Table 1. The dropouts did not differ from the responders according to age, sex and baseline pain and WOMAC scores.

Table 1. Patient characteristics at baseline (n=139)

Patient characteristics	**baseline scores**
sociodemographic	
age, in years; mean (SD)	51.7 (15.7)
gender; % male	31.7%
body mass index (weight/height^2); mean (SD)	25.9 (4.1)
smoking; % yes / ever	68.3%
working; % working	45.7%
marital status; % living together / married	77.0%
children; % children in household	43.1%
children <5; % children <5 in household	14.1%
education;	42.0%
% primary	
% secundary	44.2%
% college / university	13.8%
characteristics of the hip complaint	
location of the hip complaint; % one hip	86.1%
duration of the hip complaint;	7.3%
% < 1 week	
% 1 – 2 weeks	9.5%
% 3 – 4 weeks	16.8%
% 1 – 2 months	13.1%
% 3 – 6 months	13.9%
% > 6 months	39.4%
had hip complaint before; % yes	55.4%
severity of the hip complaint	41.0%
% almost always bothering	
% regularly bothering	27.3%
% now and then bothering	22.3%
% not bothering	9.4%
perceived cause of the hip complaint;	
% overload during usual activities	17.3%
% overload during unusual activities	5.8%
% overload during exercise	15.1%
% injury during exercise	2.9%
% injury	7.2%
% stress	7.9%
% illness	5.0%
% unknown	45.3%
% other	22.3%
outcome measures	
pain on a 11-point numerical rating scale; mean score (SD)	5.1 (2.2)
WOMAC* subscale pain; 0-100; mean score (SD)	45.6 (19.8)
WOMAC subscale stiffness; 0-100; mean score (SD)	43.6 (26.0)
WOMAC subscale functioning; 0-100; mean score (SD)	42.3 (21.4)
intra-individual factors	
menopause; % in menopause	10.8%
pain medication; % taking pain medication	64.7%
pain coping;	
PCI** subscale 1: pain transformation; 4-16; mean score (SD)	8.6 (2.8)
PCI subscale 2: distraction; 5-20; mean score (SD)	10.7 (3.1)
PCI subscale 3: reducing demands; 3-12; mean score (SD)	6.0 (1.8)
PCI subscale 4: retreating; 7-28; mean score (SD)	10.7 (3.7)
PCI subscale 5: worrying; 9-36; mean score (SD)	15.6 (4.2)
PCI subscale 6: resting; 5-20; mean score (SD)	9.6 (2.9)

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Table 1 continued - Patient characteristics at baseline (n=139)

Patient characteristics	baseline scores
distress – 4DSQ† subscale; 0-12; mean score (SD)	4.0 (3.2)
kinesiophobia –1: fear and avoidance of activity; 0-100; mean score (SD)	50.3 (16.1)
kinesiophobia –2: importance of activity; 0-100; mean score (SD)	50.4 (22.1)
perceived general health: subscale from the SF-36††; 1-5; mean score (SD)	2.9 (0.8)
quality of life; 5-point numerical rating scale; mean score (SD)	2.7 (0.7)
vitality; subscale from the SF-36; 0-100; mean score (SD)	58.5 (17.0)
kind of musculoskeletal complaints;	
% only a hip complaint	23.4%
% more complaints of the lower extremities	8.8%
% musculoskeletal complaints of both upper and lower extremities	67.8%
comorbidity; % yes	46.3%
extra-individual factors	
ACSM position stand; % meet the norm	11.1%
norm for healthy activity; % meet the norm	41.5%
social support; Social Support Scale; 12-60; mean score (SD)	19.1 (8.0)

**Western Ontario and McMaster Universites Osteoarthritis index, **Pain Coping Inventory. †Four Dimensional Symptom Questionnaire, ††Medical Outcomes Study 36-item Short Form Health Survey*

Course of hip complaints

After 3 months of follow-up 24% of the patients indicated that they were recovered. This proportion increased to 37% after 12 months.

The course of pain intensity is demonstrated in Figure 1. After 3 months a mean reduction of 1.4 points in pain intensity was observed. This was a statistically significant ($p<0.01$) improvement of 27% from baseline. After 12 months of follow-up a mean reduction of 2.0 points (41%) from baseline was seen. This reduction was statistically significant compared to baseline scores and to scores after 3 months of follow-up (both $p<0.01$).

Figure 1. The course of pain (mean scores and SD, range 0-10) in patients with hip complaints in general practice

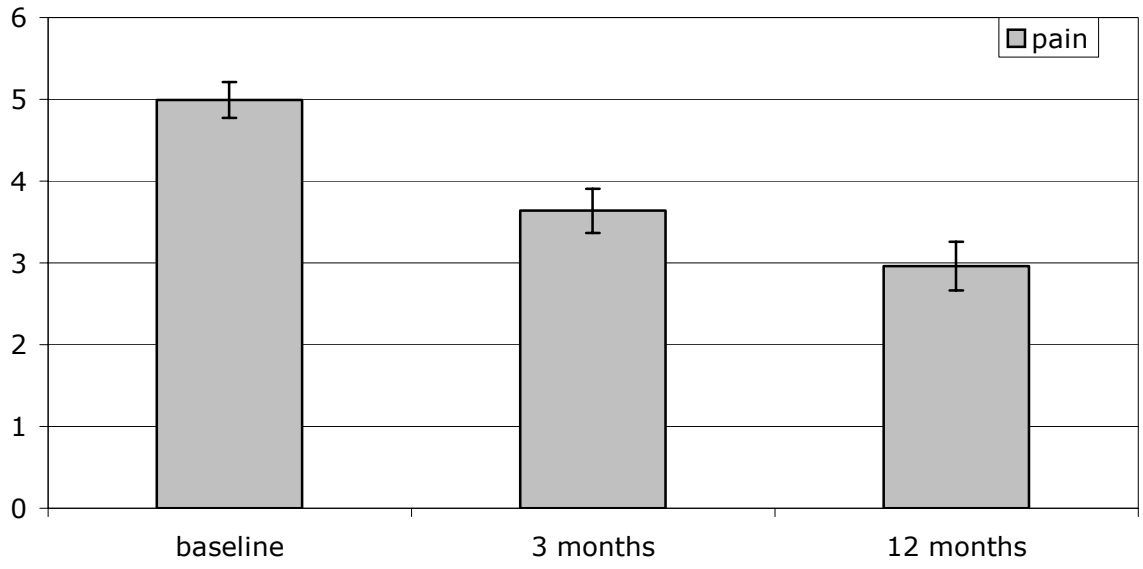
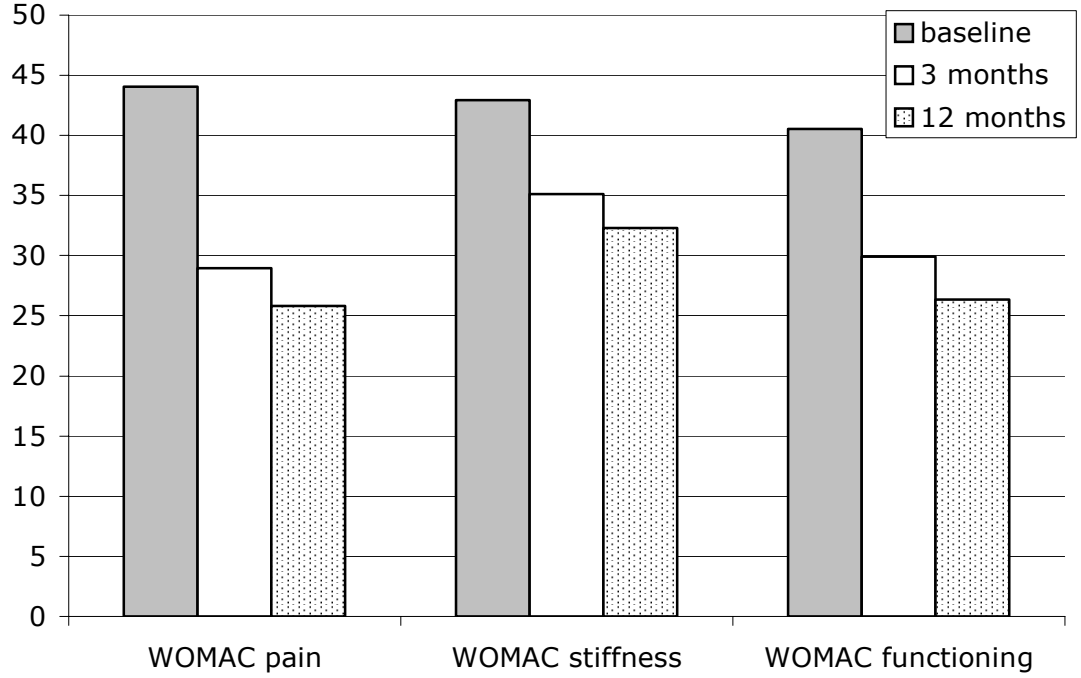


Figure 2 represents the course of the WOMAC scores. All subscales showed a statistically significant improvement both after 3 and 12 months ($p<0.01$), compared to baseline scores. Improvements ranged from 18% (WOMAC stiffness) to 34% (WOMAC pain) after 3 months and ranged from 25% (WOMAC stiffness) to 41% (WOMAC pain) after 12 months. After twelve months WOMAC stiffness and WOMAC pain were not statistically different from 3 months of follow-up. After twelve months of follow-up WOMAC functioning did show a statistically significant difference in contrast with 3 months of follow-up ($p<0.05$).

Figure 2. The course of WOMAC scores (mean scores and SD, range 0-100) in patients with hip complaints in general practice



Prognostic indicators of outcome

Table 2 presents the variables that showed a significant association with recovery, a change in pain intensity or a change in functioning in the univariate analyses after 3 or 12 months. These prognostic indicators were considered in the multivariate analyses. A statistically significant association with all outcome measures ($p<0.20$) both after three and after twelve months was seen for age, the duration of the hip complaint, having had a hip complaint before, severity of the hip complaint, as well as for having co-existing musculoskeletal complaints.

Table 2 Results of the univariate analyses: significant predictors (p<0.20), entered in multiple regression analysis

	after 3 months			after 12 months		
sociodemographic	**recovery** HR* (95% CI)	**change in pain** b** (95% CI)	**change in functioning** b** (95% CI)	**recovery** HR* (95% CI)	**change in pain** b** (95% CI)	**change in functioning** b** (95% CI)
age	0.98 (0.96 – 1.00)	-0.05 (-0.08 – -0.01)	-0.40 (-0.66 – 0.14)	0.98 (0.96 – 1.00)	-0.06 (-0.09 – -0.02)	-0.50 (-0.80 – -0.20)
BMI		-0.12 (-0.24 – -0.01)	-0.92 (-1.92 – 0.08)			
BMI >25	0.56 (0.27 – 1.15)			0.40 (0.21 – 0.78)	-1.54 (-2.68 – -0.40)	-13.83 (-23.11 – -4.55)
smoking		-1.27 (-2.31 – -0.23)			-1.12 (-2.34 – 0.10)	-6.75 (-16.94 – 3.43)
working	1.86 (0.89 – 3.85)		6.85 (-1.41 – 15.11)	1.88 (1.00 – 3.51)	1.76 (0.66 – 2.87)	14.46 (5.40 – 23.53)
marital status	1.80 (0.84 – 3.84)					
children			6.04 (-2.36 – 14.45)			7.45 (-2.02 – 16.93)
education (middle vs. lower)					-0.82 (-2.06 – 0.42)	-10.06 (-20.30 – 0.18)
characteristics hip complaint						
location hip complaint	0.21 (0.03 – 1.56)					
duration hip complaint	0.59 (0.47 – 0.73)	-0.66 (-0.93 – -0.39)	-5.80 (-8.00 – -3.59)	0.67 (0.56 – 0.81)	-0.61 (-0.94 – -0.28)	-6.51 (-9.11 – -3.91)
had hip complaint before	0.09 (0.03 – 0.28)	-1.54 (-2.50 – -0.58)	-13.92 (-21.91 –- 5.93)	0.31 (0.16 – 0.62)	-1.89 (-2.98 – -0.80)	-16.23 (-24.18 – -7.29)
severity of the hip complaint	1.83 (1.31 – 2.55)	0.60 (0.13 – 1.08)	3.50 (-0.53 – 7.53)	1.81 (1.36 – 2.41)	0.96 (0.42 – 1.49)	6.15 (1.66 – 10.64)
causes:						
-overload during unusual activities	2.23 (0.78 – 6.39)	1.99 (0.02 – 4.00)	20.44 (4.17 – 36.70)			14.21 (-6.26 – 34.67)
-overload during exercise	2.01 (0.90- 4.51)	1.34 (-0.00 – 2.69)	9.76 (-1.50 – 21.02)	2.36 (1.24 – 4.50)		
-injury during exercise	2.88 (0.69 – 12.09)	2.68 (-0.50 – 5.85)	43.89 (18.45 – 69.32)			21.27 (-3.44 – 45.97)
-stress			-12.39 (-27.28 – 2.50)		-1.69 (-3.66 – 0.29)	-14.17 (-30.25 – 1.92)
-illness					-1.82 (-4.56 – 0.92)	
-unknown					0.76 (-0.38 – 1.90)	
-other		-1.29 (-2.45 – -0.14)		0.50 (0.20 – 1.28)		
baseline scores						
pain		0.59 (0.40 – 0.79)	2.22 (0.37 – 4.06)		0.55 (0.32 – 0.78)	3.64 (1.61 – 5.66)
WOMAC pain	0.99 (0.97 – 1.00)		0.22 (0.01 – 0.43)	0.98 (0.97 – 1.00)		0.28 (0.04 – 0.52)
WOMAC stiffness	0.99 (0.97 – 1.00)		0.13 (-0.03 – 0.28)	0.99 (0.98 – 1.00)		
WOMAC functioning		0.02 (0.00 – 0.04)	0.45 (0.27 – 0.64)		0.03 (0.00 – 0.06)	0.47 (0.27 – 0.68)
intra-individual						
pain medication			-7.33 (-16.05 – 1.40)			
PCI1: pain transformation						
middle vs. lowest tertile	0.50 (0.23 – 1.08)		-8.67 (-19.56 – 2.22)	0.67 (0.33 – 1.36)		
highest vs. lowest tertile	0.20 (0.07 – 0.62)		-4.64 (-16.10 – 6.82)	0.52 (0.23 – 1.16)		
PCI4: retreating						
middle vs. lowest tertile						0.73 (-10.85 – 12.31)
highest vs. lowest tertile						7.57 (-3.76 – 18.91)
PCI5: worrying						
middle vs. lowest tertile	1.05 (0.48 – 2.31)					
highest vs. lowest tertile	0.30 (0.11 – 0.85)					
PCI6: resting						
middle vs. lowest tertile	0.68 (0.31 – 1.49)	0.38 (-0.82 – 1.57)				
highest vs. lowest tertile	0.37 (0.13 – 1.05)	-0.98 (-2.24 – 0.29)				
distress						
middle vs. lowest tertile			4.75 (-5.86 – 15.36)			
highest vs. lowest tertile			12.20 (-2.27 – 26.67)			
kinesiophobia:						
-importance of exercise						
middle vs. lowest tertile		0.98 (-0.37 – 2.33)		1.94 (0.67 – 5.58)		
highest vs. lowest tertile		0.32 (-1.24 – 1.88)		2.32 (0.76 – 7.12)		
general health		-0.52 (-1.17 – 0.12)	-4.08 (-9.57 – 1.42)	0.70 (0.49 – 1.02)		
quality of life			-4.93 (-10.68 – 0.83)	0.66 (0.43 – 1.02)		-4.35 (-10.97 – 2.28)
vitality						
middle vs. lowest tertile		-0.74 (-1.85 – 0.37)		1.22 (0.57 – 2.64)		0.61 (-9.90 – 11.13)
highest vs. lowest tertile		0.13 (-1.19 – 1.45)		2.45 (1.15 – 5.23)		10.35 (-2.32 – 23.02)

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Table 2 continued - Results of the univariate analyses: significant predictors (p<0.20), entered in multiple regression analysis

co-existing musculoskeletal comp.						
lower extr.comp. vs only hip comp.						-5.96 (-24.74 – 12.83)
lower and upper vs. only hip comp	0.51 (0.11 – 2.30)	-1.77 (-3.78 – 0.25)	-14.83 (-31.59 – 1.93)	1.04 (0.38 – 2.85)	-0.12 (-2.43 – 2.19)	-10.37 (-21.35 – 0.62)
comorbidity	0.52 (0.24 – 1.10)	0.58 (-1.77 – 0.62)	-4.65 (-14.64 – 5.34)	0.52 (0.27 – 1.01)	-0.95 (-2.30 – 0.39)	
extra-individual	0.60 (0.28 – 1.29)		-7.74 (-15.69 – 0.21)			
ACSM position stand				1.83 (0.81 – 4.14)		
norm for healthy activity		0.93 (-0.07 – 1.92)		1.61 (0.86 – 2.99)	0.99 (-0.12 – 2.09)	
social support		-0.05 (-0.11 – 0.01)				

HR: Hazard Ratio, b: regression coefficient, CI: Confidence Interval, vs: versus, extr: extremities, comp.:complaint(s), WOMAC: Western Ontario and McMaster Universites Osteoarthritis index, PCI: Pain Coping Inventory, ACSM: American College of Sports Medicine
**HR < 1.00 = a reduced probability of recovery compared to the reference group; a HR > 1.00 = an increased probability of recovery compared to the reference group;*
***b > 0 = greater reduction in pain or more improvement in functioning, b < 0 = less reduction in pain or less improvement in functioning*

Prognostic indicators of outcome after three months

Table 3 demonstrates the variables which were significantly related to recovery, a change in pain intensity or a change in functioning after three months. A shorter duration of the hip complaint, not having had a hip complaint before and a low score on the pain coping subscale "worrying" were associated with a higher probability of recovery after three months. The area under the ROC curve was 0.91 (95% confidence interval: 0.86 – 0.97). The following variables were related to more reduction in pain intensity after three months: not smoking, a shorter duration of the hip complaint, more severe hip complaints at baseline, the perceived cause of the complaint was overload during unusual activities or overload during exercise, having more pain at baseline and meeting the norm for healthy activity. The multiple regression model explained 60% of the variance of change in pain intensity. More improvement in functioning after three months was correlated with the following variables: a shorter duration of the hip complaint, the perceived cause of the complaint was overload during unusual activities, less pain at baseline on the WOMAC subscale pain, worse WOMAC functioning scores at baseline, having a low score on the pain coping subscale "pain transformation", no comorbidity. The multiple regression model explained 49% of the variance of change in functioning.

Table 3 Prognostic indicators of recovery (AUC=0.91), change in pain intensity (R^2=0.60) and change in functioning (R^2=0.49) after three months

		recovery			change in pain			change in functioning		
sociodemographic	**analysis**	**HR***	**95% CI**	**p**	**b****	**95% CI**	**p**	**b****	**95% CI**	**p**
smoking	vs. not				-0.95	-1.67 – -0.23	0.01			
characteristics hip complaint										
duration hip complaint	continuous	0.68	0.53 – 0.88	0.00	-0.63	-0.85 – -0.41	0.00	-5.88	-7.72 – -4.04	0.00
had hip complaint before	vs. not	0.21	0.06 – 0.73	0.01						
severity hip complaint	continuous				0.46	0.09 – 0.83	0.02			
cause: overload during unusual activities	vs. not				1.65	0.32 – 2.98	0.02	11.19	-0.94 – 23.32	0.07
cause: overload during exercise	vs. not				1.57	0.65 – 2.49	0.00			
baseline scores										
pain	continuous				0.72	0.56 – 0.88	0.00			
WOMAC-pain	continuous							-0.24	-0.48 – 0.00	0.05
WOMAC-functioning	continuous							0.68	0.45 – 0.92	0.00
intra-individual										
PCI1: pain transformation - middle tertile	vs. lowest tertile							-7.15	-15.14 – 0.83	0.08
- highest tertile	vs. lowest tertile							-4.13	-13.11 – 4.85	0.36
PCI5: worrying - middle tertile	vs. lowest tertile	0.79	0.36 – 1.74	0.56						
- highest tertile	vs. lowest tertile	0.35	0.12 – 1.01	0.05						
comorbidity	vs. not							-12.06	-18.27 – -5.85	0.00
extra-individual										
Norm healthy activity	vs. not meeting norm				0.95	0.27 – 1.63	0.01			

HR: Hazard Ratio, b: regression coefficient, CI: Confidence Interval, vs: versus, WOMAC: Western Ontario and McMaster Universites Osteoarthritis index, PCI: Pain Coping Inventory
**HR < 1.00 = a reduced probability of recovery compared to the reference group; a HR > 1.00 = an increased probability of recovery compared to the reference group*
***b > 0 = greater reduction in pain or more improvement in functioning, b < 0 = less reduction in pain or less improvement in functioning*

Prognostic indicators of outcome after twelve months

Table 4 demonstrates the variables which were significantly related to recovery, a change in pain intensity or a change in functioning after twelve months. A shorter duration of the hip complaint, the perceived cause of the complaint was overload during sport, and a higher score on the vitality scale at baseline were associated with a higher probability of recovery after twelve months. The area under the ROC curve was 0.89 (95% confidence interval: 0.83 – 0.95). The following variables were related with more reduction in pain intensity after twelve months: the patient was working, no history of hip complaints, had more severe hip complaints and more pain at baseline and met the norm for healthy activity. The multiple regression model explained 46% of the variance of change in pain intensity. More improvement in functioning after twelve months was correlated with the following variables: the patient was not smoking, was working, had a shorter duration of the hip complaint, had more pain during baseline, showed worse WOMAC functioning scores at baseline, scored higher on the vitality scale at baseline. The multiple regression model explained 54% of the variance of change in functioning.

Table 4 Prognostic indicators of recovery (AUC=0.89), change in pain intensity (R^2=0.46) and change in functioning (R^2=0.54) after twelve months

		recovery			change in pain			change in functioning		
sociodemographic	**analysis**	**HR***	**95% CI**	**p**	**b****	**95% CI**	**p**	**b****	**95% CI**	**p**
smoking	vs. not							-8.46	-15.84 – -1.07	0.03
working	vs. not				1.49	0.62 – 2.35	0.00	14.86	7.87 – 21.85	0.00
characteristics hip complaint										
duration hip complaint	continuous	0.67	0.55 – 0.82	0.00				-6.46	-8.58 – -4.33	0.00
had hip complaint before	vs. not				-1.43	-2.30 – -0.55	0.00			
severity hip complaint	continous				0.86	0.42 – 1.29	0.00			
cause: overload during exercise	vs. not	2.03	1.06 – 3.89	0.03						
baseline scores										
pain	continuous				0.73	0.53 – 0.93	0.00	2.22	-0.06 – 4.50	0.00
WOMAC-functioning	continuous							0.44	0.21 – 0.68	0.00
intra-individual										
vitality - middle tertile	vs. lowest tertile	1.79	0.78 – 4.09	0.17				11.48	3.63 – 19.34	0.01
- highest tertile	vs. lowest tertile	2.52	1.18 – 5.41	0.02				14.83	5.67 – 24.00	0.00
extra-individual										
Norm healthy activity	vs. not meeting norm				0.80	-0.05 – 1.65	0.06			

HR: Hazard Ratio, b: regression coefficient, CI: Confidence Interval, vs: versus, WOMAC: Western Ontario and McMaster Universites Osteoarthritis index
**HR < 1.00 = a reduced probability of recovery compared to the reference group; a HR > 1.00 = an increased probability of recovery compared to the reference group*
***b > 0 = greater reduction in pain or more improvement in functioning, b < 0 = less reduction in pain or less improvement in functioning*

Discussion

We evaluated the course of new hip complaints in 139 patients in general practice. Only 24% of the patients indicated that they were recovered after three months. This proportion increased to 37% after twelve months. Despite this low recovery rate, significant mean improvements in pain intensity and functioning were found. A mean reduction in pain intensity of 41% and a mean improvement in functioning of 35% were found after 12 months.

Different prognostic indicators were found to be associated with perceived recovery, changes in pain intensity and changes in functioning. Similar to a previous study in patients with back pain[35], and similar to our previous study in patients with knee complaints (submitted for publication) we found no prognostic indicator to be independently associated with a better prognosis for all outcome measures after both three and twelve months. Possibly the mechanisms underlying the course of pain and the course of physical functioning are influenced by different variables.

As expected, patients with more pain at baseline experienced more pain reduction as compared to patients with less pain at baseline. Similarly, patients with worse physical functioning at baseline experienced more improvement in physical functioning as compared to patients with better physical functioning at baseline. We assume that this finding can be explained by the fact that patients with higher scores at baseline had more room for improvement. However, these patients still had considerable pain and limitations in functioning after three and twelve months.

Regarding sociodemographic variables, smoking was associated with worse outcomes both after three and after twelve months. Previous research has found smoking to be correlated with lower physical functioning in low back pain patients[36]. Other studies have indicated an association of smoking with musculoskeletal pain[37-39]. Several studies have tried to explain this relationship. One possibility concerns a pharmacological effect of tobacco smoke. Smoking tobacco might cause general damage to musculoskeletal tissues[38;40;41]. Another possibility is that people who smoke are more likely to report pain and disability[39]. A recent community survey aims in the same direction: adolescent smokers had multiple somatic symptoms, poorer self reported health and greater use of healthcare services than did age matched non-smokers [42].

Regarding characteristics of the complaint, a longer duration of the hip complaint was associated with worse outcomes on all outcome measures after three months and with a lower probability of recovery and less improvement in functioning after twelve months. A history of previous hip complaints was also associated with a worse prognosis: concerning recovery after three and pain after twelve months. In addition, a more severe complaint was associated with

less reduction in pain both after three and twelve months. These findings may be explained by the fact that these patients may suffer from a chronic condition such as osteoarthritis. These complaints have been found to account for a poor prognosis[43;44]. Unfortunately in our study we were unable to collect reliable information on the diagnoses made by the GP, which makes it difficult to test this hypothesis.

Some perceived causes of the complaint turned out to be significant prognostic indicators of favourable outcomes. Patients who thought that the cause of their complaint was overload during unusual activities or exercise, showed more reduction in pain and more improvement in functioning after three months as compared to patients that did not consider these circumstances to be the cause of their complaint. Patients who thought that their complaint was caused by overload during exercise, also had a higher probability of recovery after twelve months. The fact that these patients were able to avoid the activities which they thought had caused their complaints, may explain their better outcome.

In our study, several pain coping strategies turned out to be significant prognostic indicators. Less improvement in functioning after three months was found for patients who scored in the middle tertile on the (active) pain coping strategy "pain transformation" (e.g. 'I pretend the pain is not present') as compared to patients who scored in the lower tertile. The same effect was found for patients who scored in the highest tertile, but this effect was smaller and not statistically significant. A lower probability of recovery after three months was found for patients who scored highest on the (passive) pain coping strategy "worrying" (e.g. 'I think that the pain will get worse'). This finding is in agreement with previous studies, which found that passive coping strategies predict a poor outcome [45-47]. Furthermore, a study among patients with rheumatoid arthritis found passive coping strategies to correlate with depression and higher levels of pain, which may indicate that both passive processes (coping) and negative processes (depression) may result in higher levels of pain[48]. In addition, worrying may also be conceptualized as entrapping the patient. Attention to pain may increase pain experiences, which can lead to catastrophizing and to avoidance of situations and activities[24]. Pain catastrophizing, the tendency to focus on pain and negatively evaluate one's ability to deal with pain is an important predictor of pain[49-51].

Vitality predicted recovery and improvements in functioning after twelve months of follow-up. Patients who scored highest on the vitality subscale showed a 2.5 times higher probability of recovery after twelve months and showed a 14 points larger improvement of functioning (on a scale from 0-100) compared to patients who scored low on the vitality subscale (Table 4). Furthermore, patients meeting the norm for healthy activity showed a better prognosis regarding a change in pain intensity, both after three and after

twelve months. These two prognostic indicators may be considered as markers of patients who are in a better health state. A physically active lifestyle has previously been shown to be associated with less physical disability in community living elderly [52]. Vitality and the norm for healthy activity may be interveniable prognostic indicators. It might be interesting to investigate whether promoting a physically active lifestyle could prevent persistent pain and functional problems in patients with hip complaints. Previous research has shown that offering a primary care-based physical activity advice did appear to positively influence the intention to exercise in sedentary older patients with osteoarthritis [53]. However, our results provide only preliminary information regarding a causal association between an active lifestyle and outcome of hip complaints, due to the observational design of our study. Investigating the effect of offering an intervention in primary care, aimed at promoting a physically active lifestyle may provide further evidence regarding this hypothesis.

Some potential prognostic indicators may have been missed in our study. In the analyses we did not include occupational factors. Several studies have found associations between occupational factors and the onset of hip complaints. Occupational physical activity, particularly the lifting of very heavy loads in the workplace at regular intervals, predisposes to hip osteoarthritis and hip pain in general[54-57]. Furthermore, a recent review has described the role of jobs and occupational physical activities on the occurrence of OA[58]. We did not consider these factors in our analyses because 42% of the patients in our study was not working. The intention of our study was to develop models that could be applied to most patients in general practice. Including occupational factors would have created models that would not be relevant to nearly half of the patients seen by the GP.

Our study adds important information. Firstly, using the results of our study, GPs can offer their patients more accurate information on their prognosis. A poor prognosis was seen for patients who reported previous hip complaints, patients who suffered from their complaint for a longer time period and patients who had more severe complaints. Furthermore, two prognostic indicators were found that might be used by GPs in advising patients about how to deal with their hip complaints. Being vital and meeting the norm for healthy activity resulted in better outcomes both after three and twelve months. Promoting a physically active lifestyle might possibly improve the prognosis of patients with hip complaints.

This is the first study to investigate the prognosis of patients with a new episode of hip complaints in general practice. Among other prognostic indicators, our study included several psychosocial potential prognostic indicators. The results demonstrate that some of these psychosocial factors, e.g. pain coping, showed to predict outcome after 3 or 12 months. Future

research should aim at investigating the mechanisms that can underly these associations.

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Chapter 8
General discussion

This thesis focuses on the burden of hip and knee complaints, presented in general practice. To study this burden, a systematic review and a prospective cohort study in Dutch general practice were performed. This Chapter summarizes the main findings of these studies, discusses a few difficulties and shortcomings of our research, and presents the conclusions that can be drawn from these findings. Finally, recommendations for further research and a final conclusion are formulated.

Answers to the research questions

Chapter 1 states the research questions that formed the basis of our study. This paragraph formulates the main conclusions for these questions.

What is the incidence and consultation rate of lower extremity complaints in general practice?

We studied the incidence of hip and knee complaints in 96 Dutch representative general practices. The incidence of lower extremity complaints in primary care was high: 63.2 per 1000 person years. Highest incidence densities were seen for knee complaints: 22.1 per 1000 person years. The incidence of most lower extremity complaints was higher for women than for men and higher in older age. About 6% of all people registered, consulted their GP at least once in the study year with a complaint of the lower extremities. This implies a considerable impact on the workload of the GP.

What evidence is present on the impact of non-traumatic hip or knee disorders on health-related quality of life (HRQL) and how is this HRQL related to the HRQL of reference populations?

Our systematic review, which summarized the results of 39 studies on HRQL in patients with hip or knee disorders, showed that the impact of non-traumatic hip or knee disorders on HRQL turned out to be substantial, especially on physical aspects of HRQL. Patients with non-traumatic hip and knee disorders scored up to 2.5 standard deviations (SD) below reference population values, especially on physical aspects of HRQL. Social and mental aspects scored up to 1 SD below reference population values, especially in patients with more severe complaints. We could not identify any studies carried out in general practice among patients presenting new episodes of hip and knee complaints.

What is the health related quality of life of patients with chronic hip and knee complaints in general practice?

HRQL was studied in 257 patients who reported chronic hip or knee complaints after 3 months of follow-up. Patients with chronic hip or knee complaints had a substantially lower health-related and overall quality of life compared to patients who had recovered from an episode of hip or knee complaints. The largest effect was found on symptoms and physical functioning: patients with chronic complaints scored up to 2.9 standard deviations below patients who had recovered from baseline hip or knee complaints.

What is the course of hip and knee complaints, presented in general practice and can predictors of outcome be identified?
For a total of 251 patients presenting with knee complaints and 139 with hip complaints in general practice, prognostic models were constructed to predict outcome after 3 and 12 months of follow-up. The predictive value of sociodemographic variables, characteristics of the complaint and several intra- and extra-individual factors was studied. Concerning knee complaints, only 25% reported recovery after three months, increasing to 44% after twelve months. A history of knee complaints, a longer duration of knee complaints at baseline or co-existing other musculoskeletal complaints, were all associated with a worse prognosis. Furthermore, distress was found to be strongly associated with less pain reduction and less improvement in functioning after 3 or 12 months.
Concerning hip complaints, only 24% reported recovery after three months, increasing to 37% after twelve months. A history of hip complaints, a longer duration of hip complaints or more severe complaints at baseline, were associated with a worse prognosis. Furthermore, more vital patients and patients who met the Norm for Healthy Activity had a higher probability of a better outcome.

Difficulties and shortcomings of the prospective cohort study
During the execution of the study, we encountered some practical and methodological difficulties. In this paragraph these difficulties are described, as the lessons we learnt may be useful to future researchers planning to undertake similar studies.
Patient recruitment
Although 97 general practitioners (GPs) from 61 general practices participated in the study, many more GPs were recruited for the study. Originally, only GPs participated who also took part in the Second Dutch National Survey of General Practice (NS2)[1]. To increase the probability that they would include as many patients as possible, a selection of ICPC codes was made that enabled the identification of patients with musculoskeletal complaints. When the GP entered one of these ICPC codes into the computer during the consultation, a pop-up screen appeared with a reminder of our study. Furthermore, the GP had a card available in the office that stated the selection criteria. Additionally, the participating GPs were telephoned and faxed many times to remind them of our study[2]. Despite all these efforts, this procedure did not result in a sufficiently large number of participants. Apparently, Lasagna's law (named after the statistician Louis Lasagna)[3] may not only be applicable to trials but also to cohort studies. This law states that eligible patients 'disappear' as soon as the recruitment of patients for a trial starts. The number of patients that is

eventually asked by the GP or willing to participate is commonly overestimated, even by a factor of 10^3.

To solve the problem, the GPs were asked to extend the inclusion period and additional GPs were recruited outside the setting of NS2. Over 450 GPs were approached of whom about 50 eventually participated in the study. These additional GPs followed the same inclusion procedure, although the supporting NS2 software, which included the pop-up reminder screen, was not available to these GPs. Furthermore, additional patients were recruited by means of advertising, using similar in- and exclusion criteria. Unfortunately, the patients who answered the advertisement could not be included in the analyses because they had very specific characteristics: they were older, frequently had hand complaints and were mostly female.

An explanation for the low inclusion rate could be the high workload of the GPs. Despite the fact that the GPs considered this study to be important and they agreed to participate, they probably gave low priority to the inclusion of patients. Since we were not able to give them an adequate reward (e.g. financial reimbursement of investigated time, postgraduate training), except for some chocolates, their motivation may have been low.

Another explanation may have been the wide range of complaints and consequently the many different kinds of patients that were eligible for participation in our study. Patients with all kinds of musculoskeletal complaints (except for back pain) were eligible for participation. It may be more efficient and easier for GPs to think about only one kind of complaint, and recruit as much of these as possible.

We think that a solution to this problem might be to let the investigator select potentially eligible patients from anonymised patient records. Each day patients who have visited their GP and who are eligible for participation could be selected and an invitation to participate in the study could be sent to the patient. By this means, the workload of the GPs can be relieved and more patients could be informed about the study. However, this procedure will be complicated to perform since (privacy) legislation forbids the investigator to view patient records. Perhaps when addresses and medical data are not linked, the Medical Ethics Committee might approve this procedure. Anonymity will have to be guaranteed until informed consent has been received from the patient.

In our study not all eligible patients were enrolled by the GPs. Exact data about the number of eligible patients who were invited to participate, and the number refusing participation were not available to us. Based on estimates of the incidence of hip and knee complaints (presented in Chapter 2), over 4000 patients must have visited a participating GP with a new episode of hip or knee complaints during the inclusion period of whom the majority probably would have met our selection criteria. However, only 333 patients filled in the

baseline questionnaire. Nonetheless, we have no indication that selection bias has strongly influenced our findings. GPs indicated that the most important reasons for not including patients concerned the exclusion criteria, and lack of time or motivation to ask all patients during office hours.

If a selection bias did occur, we speculate that especially older patients with more chronic conditions have participated in our study. Younger patients with more acute hip or knee complaints may have been missed because of two reasons: (1) the GP may not have asked these patients since he expected that the patient would be recovered within a few days, or (2) the patient may not have wanted to participate in the study since (s)he may already have recovered from the complaint by the time the baseline questionnaire arrived. Since acute complaints in most patients have a better prognosis than chronic conditions, for example osteoarthritis, it may be more important to identify (interveniable) predictors of outcome in these more chronic complaints.

Missing prognostic indicators

Some potential prognostic indicators may have been missed in our study. In the analyses we did not include occupational factors as potential predictors of outcome, although these factors have been shown to be risk factors for the occurrence of knee osteoarthritis[4]. Several studies have also found associations between occupational factors and the onset of hip complaints. Occupational physical activity, particularly the lifting of very heavy loads in the workplace at regular intervals, predisposes to hip osteoarthritis and hip pain in general[5-8]. Furthermore, a review has described the role of jobs and occupational physical activities on the occurrence of osteoarthritis[9]. We did not examine these factors because 42% of the patients in our study did not have paid work. Our objective was to develop models that can be applied to most patients with hip or knee complaints in a general practice population. Examining occupational factors would create models that would not be relevant to nearly half of the patients seen by the GP.

Furthermore, we were not unable to collect reliable information about medical diagnoses as given by the GP, nor were we able to include a physical examination in the study. The prospective cohort study included patients with all musculoskeletal complaints excluding back pain. Given the total number of participants (both upper and lower extremities) in the study (n=1200), a physical examination, for example by a research assistant, was not feasible. In addition, we wanted to limit the efforts by the GPs in our study. This means that we did not ask the GP to record the medical diagnosis for each patient for research purposes. Initially, since diagnostic information might be useful in our prognostic studies, we wanted to use the ICPC-codes the GP enters during consultation. However, these ICPC-codes were only available from the GPs who participated in the NS2 (about half of all GPs in our study) and this information could hardly be linked to our information. Furthermore, diagnoses can often

not be made at first presentation. The purpose of our study was to construct models that may help the GP to predict prognosis at the moment the patient visits the GP with a new episode of hip or knee complaints.

Implications for further research

Relevant prognostic indicators

In our study six prognostic models have been developed both for patients with knee complaints and for patients with hip complaints. These models have indicated several prognostic factors that can be used by GPs in predicting prognosis and can form starting points for further research. Both in patients with hip or knee complaints, prognosis was worse for patients who reported previous hip or knee complaints, and for those who had suffered from their complaint for a longer time period. Prognosis was more favourable in patients with knee complaints who showed lower levels of distress and in patients with hip complaints who met the Norm for Healthy Activity or were more vital. The discriminative abilities of the models, R2's and AUC's, are reasonably high. In the models concerning patients with knee complaints 41-53% of the variance in pain reduction and improvement in functioning could be explained by the predictors. Concerning perceived recovery, the AUC was 0.77 after three and 0.72 after twelve months. In the models concerning patients with hip complaints 46-60% of the variance in pain reduction and improvement in functioning could be explained by the predictors. Concerning perceived recovery, the AUC was 0.91 after three months and 0.89 after twelve months. Furthermore, these models contain not very many variables, which make them suitable to apply in daily practice.

However, more research is needed to validate the models found in this study. This means that the models need to be tested in other patient populations to see if the same predictors still show a strong association with outcome. Validation studies could be carried out in general practice populations similar to ours, and later in other settings [10]. Our study is one of the first to investigate the influence of psychosocial predictors on outcome of hip or knee complaints in a primary care population. The results are promising since indicators of discriminative ability of the models (R^2 and AUC) are satisfactory and the patient groups are substantial. However, since the performance of prediction models is always lower in a different population, external validation is essential before implementing prediction models in clinical practice [11].

Interveniable predictors of outcome?

Furthermore, our study indicated vitality and meeting the Norm for Healthy Activity (in hip complaints) and distress (in knee complaints) to be strong predictors. Other studies have found psychological distress to predict persistent pain in patients with musculoskeletal illness presented in primary care [12;13] and to be cross-sectionally associated with functional status in

patients suffering from osteoarthritis of the knee[14]. In addition, distress has been shown to predict functional outcome after total knee replacement surgery[15] and to predict disability in patients with knee osteoarthritis[16]. The predictors vitality and meeting the Norm for Healthy Activity may be considered as markers of patients who are in a more healthy state. A physically active lifestyle has previously been shown to be associated with less physical disability[17].

It might be interesting to investigate in future randomised trials whether early intervention aimed at reducing distress can prevent persistent pain and functional problems in patients with knee complaints in a primary care setting and whether promoting a physically active lifestyle could prevent persistent pain and functional problems in patients with hip complaints. Previous research has shown that offering a primary care-based physical activity advice did appear to positively influence the intention to exercise in patients with osteoarthritis[18].

Application in general practice

The results of our study can be used by GPs to inform patients about their prognosis. Ideally the GP would be helped by a prognostic scoring system on which the GP can calculate the probability of recovery for every individual patient. This should be possible, provided that our models are externally validated in other patient populations. A disadvantage of our models in developing such a scoring system is the fact that we used several multiple item questionnaires. A GP does not have enough time to submit all these questions to patients within everyday clinical practice. Our study has identified which concepts are important in predicting prognosis, such as distress and vitality. Further research can be aimed at developing clinical prediction rules based on single questions that may substitute long questionnaires and can be used by GPs during everyday consultation.

Conclusion

The burden of hip and knee complaints presented in general practice is substantial. In this thesis the impact of hip and knee complaints on patients and on the workload of the GP has been investigated. Patients with hip or knee complaints seemed to experience worse health related quality of life compared to reference populations and patients who have recovered an episode of these complaints. Furthermore, not even half of the patients indicated that they were recovered after one year. GPs are confronted often with hip and knee complaints. About 6% of all registered patients consulted their GP at least once a year with a complaint of the lower extremities. This implies a considerable impact on the workload of the GP.

Despite their frequent occurrence and large impact not much research has been directed towards hip and knee complaints in primary care. Our study

is one of the first studies to do so. Our data support the effort of the organisers of the Bone and Joint Decade[19-21] to determine the burden of musculoskeletal diseases and underscore their statement that the HRQL and overall quality of life of people with hip or knee complaints should be improved.

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Summary

Musculoskeletal complaints occur frequently and have large consequences for public health. Information about the incidence of hip and knee complaints in general practice, the impact of these complaints on quality of life and the prognosis after presentation in general practice is far from complete. Knowledge about determinants of the clinical course of musculoskeletal complaints is essential for management decisions and to inform patients about their prognosis. The purpose of this thesis was to study the impact of hip and knee complaints on patients and on the workload of the general practitioner. Concerning patients, the impact on health related quality of life, the course and prognostic indicators of outcome of hip and knee complaints have been studied. Concerning GPs, the incidence and consultations rates in primary care have been investigated. Several research questions were formulated:

1. What is the incidence and consultation rate of lower extremity complaints in general practice?
2. What is the available evidence on the impact of non-traumatic hip or knee disorders on health-related quality of life (HRQL), and how does HRQL in patients with hip or knee disorders relate to the HRQL of reference populations?
3. What is the HRQL of patients with chronic hip and knee complaints in general practice?
4. What is the course of hip and knee complaints, presented in general practice and can predictors of outcome be identified?

The aims of Chapter 2 were to estimate the incidence and consultation rate of lower extremity complaints in general practice. Data were obtained from the Second Dutch National Survey of General Practice, in which 195 GPs in 104 practices recorded all contacts with patients during 12 consecutive months. Contacts were recorded in computerized patient records. GPs classified the symptoms and diagnosis for each patient at each consultation according to the International Classification of Primary Care (ICPC). Incidence densities and consultation rates for different complaints were calculated. During the registration period 63.2 GP consultations per 1000 person years were attributable to a new complaint of the lower extremities. Highest incidence densities were seen for knee complaints: 21.4 per 1000 person years for women and 22.8 per 1000 person years for men. The incidence of most lower extremity complaints was higher for women than for men and higher in older age. Both incidences of and consultation rates for lower extremity complaints are substantial in general practice. This implies a considerable impact on the workload of the GP.

Chapter 3 comprises a systematic review that aimed to summarize the available evidence on the impact of non-traumatic hip or knee disorders on

health-related quality of life (HRQL), and to compare their HRQL with data from reference populations. Studies were identified by an electronic search of the MEDLINE, PsychInfo and Cinahl databases. Studies with the following features were included: study population includes patients with non-traumatic hip or knee disorders, the Short Form 36 Health Survey (SF-36) or Short Form 12 Health Survey (SF-12) was used as an outcome measure and mean scores on these HRQL measures had to be presented. Using mean HRQL-scores from the selected studies and scores from reference populations, z-scores were computed. Pooled estimates were computed for homogeneous subgroups of studies. A total of 39 studies met the inclusion criteria. Mean HRQL-scores and information about the study population were extracted. Patients with non-traumatic hip and knee disorders scored up to 2.5 standard deviations (SD) below reference population values, especially on physical aspects of HRQL. Social and mental aspects scored up to 1 SD below reference population values, especially in patients with more severe complaints. The impact of non-traumatic hip or knee disorders on HRQL turns out to be substantial, especially on physical aspects of HRQL. Only one study measured HRQL in patients with hip or knee disorders in a primary care setting.

Chapter 4 describes the design of our prospective cohort study that has been conducted in Dutch general practice. Patients were eligible for participation in the study if they met the following inclusion criteria: patients who visit their general practitioner with a new complaint or new episode of complaint of the neck, shoulder, elbow, wrist, hand, arm, hip, knee, ankle or foot; 18 years or above and capable of filling in Dutch questionnaires. An episode of complaint is considered 'new' if patients have not visited their GP for the same complaint during the preceding 3 months. Patients are excluded from the study if a fracture, malignancy, prosthesis, amputation or congenital defect causes the presented complaint and if patients are pregnant. Participants received complaint-specific questionnaires by mail at baseline and after 3, 6, 12 and 18 months. The following putative determinants of the course of the complaints have been investigated: sociodemographic characteristics, characteristics of the complaint, psychosocial job characteristics, physical workload, physical activity during leisure time, pain coping, mood, kinesiophobia, social support, optimism. The primary outcomes were perceived recovery, pain, functional status, sick leave and overall quality of life.

Chapter 5 describes the health-related and overall quality of life (HRQL) of chronic hip and knee complaints in general practice. Data were obtained from the cohort study described in Chapter 4. HRQL at three months follow-up was analysed. HRQL was measured as: symptoms, physical, psychological and social functioning, and general health perceptions, using the Western Ontario

and McMaster Universities osteoarthritis index (WOMAC) and the MOS 36-Item Short-Form-Health Survey (SF-36). Overall quality of life was measured using a 5-point rating scale. The results show that patients with chronic hip or knee complaints have a substantial lower health-related and overall quality of life compared to patients who had recovered from their hip or knee complaints since baseline. The largest effect was found on symptoms and physical functioning: patients with chronic complaints scored up to 2.9 standard deviations lower (i.e. had worse HRQL) than patients who had recovered from baseline hip or knee complaints. Scores of patients with both chronic hip and knee complaints were significantly worse than scores of patients with only knee complaints for most subscales. In patients with chronic hip or knee complaints the worst scores were seen on scales that measure symptoms and physical functioning, but still a substantially lower score was obtained for overall quality of life. Quality of life was poorer for patients with both chronic hip and knee complaints compared to those with chronic hip or knee complaints only.

The objective of Chapter 6 was to describe the course of knee complaints and to identify predictors of outcome in patients visiting their general practitioner with a new episode of knee complaints. Data were obtained by self-administered questionnaires in the cohort study described in Chapter 4. Three outcomes were assessed after three and after twelve months of follow-up: perceived recovery, changes in pain and changes in physical functioning. As potential predictors of outcome several sociodemographic variables, characteristics of the complaint, baseline scores of the outcome measures, intra- and extra-individual variables were analysed using multiple regression analyses. We included 251 patients with knee complaints, presented in general practice. Only 25% reported recovery after three months, increasing to 44% after twelve months. A history of knee complaints, a longer duration of knee complaints or co-existing other musculoskeletal complaints, were associated with a worse prognosis. Furthermore, distress was found to be strongly associated with less pain reduction and less improvement in physical functioning. In the linear regression models 41-53% of the variance in pain reduction and improvement in functioning could be explained by the predictors. The area under the ROC curves, estimating predictive accuracy of the Cox regression models concerning perceived recovery was 0.77 after three and 0.72 after twelve months.

The purpose of Chapter 7 was to investigate the course and to identify relevant prognostic indicators of outcome in patients with hip complaints presented in general practice. Data were obtained by self-administered questionnaires in the cohort study described in Chapter 4. The same three

outcome measures were assessed as in Chapter 6, both after three and twelve months of follow-up: perceived recovery, change in pain intensity and change in functioning. Multiple regression analyses were performed to investigate association between the potential prognostic indicators and the three outcome measures. The study included 139 patients with hip complaints, presented in general practice. Only 24% reported recovery after three months, increasing to 37% after twelve months. A history of hip complaints, a longer duration of hip complaints or more severe complaints, were associated with a worse prognosis. Furthermore, more vital patients and patients who met the Norm for Healthy Activity had a higher probability of a better prognosis. In the linear regression models 46-60% of the variance in pain reduction and improvement in functioning could be explained by the predictors. The area under the ROC curves, estimating predictive accuracy of the Cox regression models concerning perceived recovery was 0.91 after three months and 0.89 after twelve months.

Chapter 8 aims to summarize the main findings of the studies, discusses a few difficulties and shortcomings of our research and presents the conclusions that can be drawn from these findings. Finally, recommendations for further research and a final conclusion are given. The difficulties that were encountered with during the conduction of the prognostic cohort study mainly concerned the recruitment of patients. Unfortunately many more GPs were asked to participate and participating GPs were asked to extend the inclusion period. Shortcomings of our study concern some potential prognostic indicators that we may have missed such as occupational factors and medical diagnoses. Further research is needed to validate the models found in this study and to develop a scoring system that can be used by GPs to calculate the probability of recovery for individual patients. In conclusion, this thesis shows that the burden of hip and knee complaints is substantial.

Samenvatting

Dit proefschrift beschrijft de invloed van heup en knieklachten op het leven van patiënten en op de werklast van de huisarts. Deze klachten komen veel voor en hebben mede daardoor een grote invloed op de volksgezondheid. Informatie over deze klachten is zeer beperkt. Kennis over hoe vaak ze precies voorkomen, hoe vaak de huisarts deze patiënten ziet en wat het verloop is van de klachten, ontbreekt. Daarom was het doel van dit proefschrift om 'kennisgat' te vullen.

In hoofdstuk 2 werd bepaald hoe vaak klachten aan de onderste extremiteiten ontstaan (incidentie) en hoe vaak de huisarts wordt geconsulteerd voor deze klachten. Het bleek dat de huisarts hiervoor vrijwel iedere dag een keer wordt geconsulteerd; het gaat dan om 6% van de ingeschreven patiënten die minimaal 1 keer per jaar met zo'n klacht bij de huisarts komen. Vooral knie klachten komen erg veel voor. Bij 21 van de 1000 patiënten (per jaar) ontstaat een knie klacht (incidentie). De werklast voor de huisarts wat betreft klachten aan de onderste extremiteiten is dus behoorlijk.

In hoofdstuk 3 staan de resultaten van een literatuuronderzoek. Er werd in de beschikbare literatuur gekeken wat er bekend is over de invloed die (niet traumatisch) heup en knie klachten hebben op de kwaliteit van leven van patiënten. Deze patiënten bleken veel lager te scoren dan mensen uit een referentie populatie. Vooral op fysiek gebied was dit verschil erg groot. Maar ook op mentaal gebied bleken patiënten met heup en knie klachten lager te scoren. Slechts 1 studie had dit soort gegevens in de huisartspraktijk verzameld.

In hoofdstuk 4 staat beschreven hoe de BewegingsApparaat Studie (BAS) is opgezet. Tijdens deze studie werden patiënten gevraagd om mee te doen, die bij de huisarts kwamen met een nieuwe klacht aan het bewegingsapparaat (nek, schouder, elleboog, pols/hand, heup, knie enkel/voet). We hebben deze patiënten anderhalf jaar gevolgd m.b.v. vragenlijsten. In deze vragenlijsten vroegen we o.a. waar ze klachten hadden, wat ze dachten dat de oorzaak was, hoe lang ze daar al last van hadden en nog meer kenmerken van hun klachten. Ook vroegen we o.a. hoe ze om gingen met pijn, hoe mensen zich voelden, hoe ze omgingen met beweging, hoe ze hun kwaliteit van leven beoordeelden en of ze tevreden waren op hun werk. Voor dit proefschrift zijn gegevens geanalyseerd van mensen met klachten aan hun heup en/of knie.
Twee onderzoeksvragen zijn worden beantwoord:

1. Hoe is de kwaliteit van leven van patiënten met chronische heup en/of knie klachten?
2. Welke factoren hebben invloed op het verloop van heup en/of knie klachten?

In hoofdstuk 5 wordt getracht de eerste vraag te beantwoorden. Patiënten die na 3 maanden nog steeds heup en/of knie klachten hadden, werden vergeleken met patiënten die na 3 maanden geen klachten meer hadden. De kwaliteit van leven van patiënten met klachten was veel slechter dan de kwaliteit van leven van patiënten die geen klachten meer hadden. Vooral patiënten die zowel heup als knie klachten hadden, toonden een mindere kwaliteit van leven.

In de hoofdstukken 6 en 7 is geprobeerd voor de tweede vraag een antwoord te vinden. Er werden analyses gedaan waarmee het verloop van heup en knie klachten kon worden beschreven en waarmee kon worden bekeken welke factoren invloed hadden op dit verloop. Zowel bij de heup als bij de knie klachten bleek dat erg veel patiënten na een jaar nog steeds last hadden van hun klachten: 56% van de patiënten met knie klachten en 63% van de patiënten met heup klachten. Zowel bij heup als bij knie klachten bleek dat patiënten die al langer last hadden van hun klachten of die klachten al eerder hadden gehad, een slechtere prognose hadden. Bij het verloop van de pijn en het functioneren van patiënten met knie klachten bleek dat patiënten die last hadden van ‘distress’ er minder goed aan toe waren. Patiënten met heup klachten die vitaal waren of voldeden aan de Norm Gezond Bewegen (een half uur per dag) bleken beter af te zijn.

Concluderend laat dit proefschrift zien dat er veel patiënten met heup en/of knieklachten zijn, die vaak lang last houden van deze klachten, en wiens klachten een redelijke invloed op hun kwaliteit van leven hebben. Ook worden deze patiënten veel gezien bij de huisarts.

Dankwoord

Hè hè, het is af!! Wat een heerlijk gevoel geeft dat… Het heeft wat zweet en tranen gekost de afgelopen vier jaar, en nu is het dan eindelijk zover. Maar ik heb dit niet alleen gedaan. Zonder de steun, hulp, vriendschap en medeleven van anderen was ik vast niet zover gekomen…

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De leden van de begeleidings- en leescommissie: Prof. Dr. Mieke Hazes, Prof. Dr. Bart Koes, Drs. Harald Miedema, Dr. Vincent Hildebrandt, Dr. Kees Gorter, Dr. Sita Bierma, Prof. Dr. Marten de Haan, Prof.Dr. Guus Lankhorst, Prof. Dr. Ben Dijkmans, Prof. Dr. Neil Aaronson. Ook al heb ik jullie de afgelopen jaren niet of nauwelijks gesproken; jullie inbreng is erg gewaardeerd!

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En dan nu mijn nieuwe collega's bij Quintiles… Ik ken jullie nog maar net, maar het voelt goed! Ik hoop dat ik nog lang met veel plezier met jullie mag samenwerken!

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Heel erg bedankt allemaal!!!

Groetjes,
Annemieke

Curriculum Vitae

Annemieke van der Waal was born in Nieuw-Vennep (The Netherlands) on March 24th, 1977. In 1995 she graduated from secondary school and started with her study Medical Biology at the Free University in Amsterdam. During this study she did research projects in Farmacology, Psychology and at the RIVM (Research for man and environment). As a secretary, she was part of the first students' board of the Biology Faculty. In 2000 she graduated and started with her PhD project at the EMGO-institute at the Free University. This project is presented in this thesis. During the 4 years she spent at the EMGO institute, she completed a Postgraduate Epidemiology Programme. In addition, she was also active at the EMGO Promovendi Working Group, the Vu Promovendi Group and the PhD Network of the Netherlands. In 2004 she started working in the farmaceutical industry as a Research Associate at Quintiles.

Annemieke van der Waal is op 24 maart 1977 geboren in Nieuw-Vennep. In 1995 haalde ze haar VWO diploma en begon met haar studie Medische Biologie bij de Vrije Universiteit in Amsterdam. Tijdens haar studie heeft ze stages gelopen bij Farmacologie, Psychologie en bij het RIVM (Rijksinstituut voor Volksgezondheid en Milieuvraagstukken). Ook nam zij als secretaris deel in de eerste studentenraad van de faculteit Biologie. In 2000 studeerde zij af en begon als promovendus aan het project dat in dit boekje beschreven staat. Tijdens dit project was zij ook actief in het EMGO promovendi overleg, het VU promovendi overleg en het Promovendi Netwerk Nederland (voormalig LAIOO). Tevens voltooide ze de Postdoctorale opleiding tot Epidemioloog. In 2004 maakte ze de overstap naar de farmaceutische industrie en begon als Research Associate bij Quintiles.